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PURĀTATTVA

Number 35

2004-2005

INDIAN ARCHAEOLOGICAL SOCIETY
NEW DELHI

ANNOUNCEMENT

Over the past few years a couple has donated to the Indian Archaeological Society a sum of Rs. 3.5 lakhs and wishes to donate another 50,000/- in April 2006, thus making a total of Rs. 4 lakhs. This is for the institution of an award, to be called 'Gurudava Ranade Award'. The interest accruing from this amount will be utilised to give the award, once in five years, to the best book on Indian Archaeology published during that period. Thus, the first award will be given towards the end of 2006 to the author of a book published between January 2000 and December 2005. Sponsors or prospective candidates are requested to submit to the Chairman, Indian Archaeological Society, three copies of the book(s) concerned by the end of March 2006. The award will be given on the occasion of the following Annual Meeting of the Society, which is usually held every year.

The committee adjudging the books shall consist of the following:

i. A nominee of the Board of Management of the Indian Archaeological Society.

ii. A nominee of the Executive Committee of the Indian Society for Prehistoric and Quaternary Studies.

iii. The Director General, Archaeological Survey of India or his nominee.

iv. Two distinguished archaeologists of the country.

To begin with, Shri. M.N. Deshpande and Shri. J.P. Joshi will be under category (v) and the former shall be the Chairman of the Committee. Later on, as and when it becomes necessary, other distinguished archaeologists may be invited to serve on the Committee, by a joint consensus of the persons mentioned in the above four categories. The members of the committee may also bring up any book for consideration. The award is open to scholars anywhere in the world.

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PURĀTATTVA

Number 35 2004-2005

Editorial

By the mid 20th Century, archaeologists all over the world started realising that India has emerged as an important player on the world's archaeological scenario due to the systematic and sustained work done during the last five decades, especially in the fields of archaeological excavations and preservation of monuments. Indian experts were invited to Nubia and other neighbouring countries like Afghanistan, Nepal, Bhutan and presently they are at Angkorwat, Cambodia, for assistance in conserving some of their monuments. India's contribution in structural conservation has been considered of high value.

However, to believe that all is well here will be self-deceiving. As a matter of fact, for more than a decade now, we are on a terrible slide — being absolutely visionless and directionless, devoid of proper leadership and global approach. The policy of the Government of India has, of late, changed; instead of professional archaeologists, the bureaucracy has started heading the Archaeological Survey of India. The situation is not better with several other academic and cultural bodies like National Museum, Anthropological Survey of India, IGNCA, Indian Council of Cultural Relations; these too are being headed by bureaucrats rather than by professionals of respective fields. Since 1993, the head of the Archaeological Survey of India has been IAS officers with little knowledge of antiquities, monuments and various other scientific disciplines of archaeology; whereas the members of the Drafting Committee of the Antiquities and Art Treasures Act, 1972, provided that only the Director General of Archaeological Survey of India can declare any object as antiquity thinking that at no time in history will there be a Director General who would not be able to ascertain the date and artistic value of an object.

We would like to quote a misadventure of bureaucratic planning — 'The Agra Heritage Tangle'. Since November 2002, the U.P. Government has spent Rs. 17 crores to move sand from one part of the dried Yamuna bed to another part in the name of reclaiming land for an ambitious 'Heritage Corridor Project', to connect Agra's best known monuments with the Taj Mahal. The 100 metre corridor was to have gardens, water bodies, footpaths and a three metre high complex housing as many as 400 shops! Although, with the intervention of the High Court, the project has been shelved, still the bureaucratic set-up thinks that it was a well conceived project which has become a victim of politics.

It may be noted that a strong resolution was moved in the meeting of the Central Advisory Board of Archaeology held on 2nd September 2005 at Delhi in the presence of Shri Jaipal Reddy, the Minister of Information and Culture, Government of India, regarding the appointment of a professional Director General in the ASI. A resolution to this effect was also passed by the members of the Indian History Congress during their annual conference held in December 2004 at Bareilly inaugurated by Shri Arjun Singh, the Minister of Human Resource Development, Government of India. The members regretted the practice of appointing administrators who are non-archaeologists and non-professionals. We also, hereby, would like to request the Government of India to consider the opinion of experts and fill up the post immediately with a competent professional archaeologist. The Government must realise that the world is asking India – "*Is there not a single competent archaeologist in the country to head the ASI ?*"

The present issue of *Puratattva* is released in the honour of Prof. A.K.Narain who established the Indian Archaeological Society in 1967 at Benaras Hindu University, Varanasi with great vision and dedication to the cause of archaeology. The Society takes this opportunity to felicitate him for his path-breaking step, and wishes him good health and many more fruitful years in academic researches.

The *Puratattva* No. 35 carries articles, notes and reports on latest excavations and explorations conducted by the Archaeological Survey of India as well as different Indian universities and research institutions. This plethora of material has created a large data-base for researchers, particularly in the context of the Indus-Saraswati Civilization. The excavations at Bhirrana and Baror, for example, established a long chronological bracket for the pre-Early Harappan phase of Indus-Saraswati Civilization. In his article on Dholavira's Geometry, Michel Danino has attempted a formidable task of bridging the Indus-Saraswati mathematical units and proportions with those of the Second Urbanization.

There are some articles on the subject of historical archaeology as well, including the report on the excavation of early medieval remains at Thakurani Tila lying in the eastern State of Tripura. This year's report on the excavations conducted at Kopia also throws much light on the cultural material of the Early Historical times. The excavations at Sanchankot and Siyapur in northern India and also at Lakkundi and Kudachi in southern India have provided substantial material for interpretation of cultural sequence and other details about the movement of the people during the Neolithic-Chalcolithic period overlapping with the Iron Age megalithic users. A few articles also shed light on the evolutionary stages of sculptural art in India, especially at Pitalkhora to the highly accomplished temple *shikharas* of the Kalachuris. An article on the 'Plant- remains from Nubia', which was lying in the old files of Prof. B.B.Lal, has also been included for publication.

The publication of this Bulletin has been possible due to the generous financial assistance from the Indian Council of Historical Research and the Archaeological Survey of India, Government of India. We are grateful to both these organizations. However, these

organizations are not responsible for the views expressed by the contributors of articles, notes and reviews to this volume; those are the personal views of the authors. The Indian Archaeological Society is also in no way responsible for their views.

Dr. S.P. Gupta went through all the articles and his suggestions have been incorporated. Dr. B.R. Mani provided all necessary editorial assistance in bringing out this issue of the Bulletin. A team of young scholars from the Indian Archaeological Society, namely Mr. Suresh Bomble and Ms. Gency Chaudhuri, have conscientiously gone through the texts of the articles and coordinated the work of making the material ready for the press. They deserve my special thanks. They were helped by our other Research Associates, namely Mr. S. Vijayakumar, Ms. Apeksha and Mr. Mohit Srivastava. Other members of the Society, Mr. Rakesh Dutta, Mr. Lakhan Trivedi, Mr. J.N.Khera and Mr. Bharat Singh have equally helped in preparing the type-script. Ms. Raj Rani Sharma, the Librarian, provided the missing references. They also deserve my grateful thanks.

Thanks are also due to Ms. Anita Mehta of Aquarelle, Ms. Swaraj Davra and members of their staff for ensuring the quality of the publication and bringing out this issue in time.

KND



Prof. Awadh Kishore Narain

Felicitations to

THE FOUNDER

INDIAN ARCHAEOLOGICAL SOCIETY

Going strong at 80, Professor Awadh Kishore Narain, born on May 28, 1925 in Uttar Pradesh, the doyen of Asian studies, needs no introduction to the students and scholars of Indology, who fondly turn the pages of *Puratattva*. His contribution to archaeology and other branches of Ancient Indian History is multi-dimensional. Presently, he is the Emeritus Professor of History, Languages and Cultures of Asia, University of Wisconsin, Madison (USA) and the Founder-Director, Bhikkhu J. Kashyap Institute of Buddhist and Asian Studies, Sarnath, Varanasi. Prof. Narain has a long and successful career of research, teaching and organizing various academic forums.

An alumni of the Banaras Hindu University, Prof. Narain had a brilliant educational record, passing with distinction both Bachelor and Masters courses in the years 1945 and 1947, respectively. His post-graduate training in Ancient Indian History, Culture and Archaeology, paved the foundations for conducting significant researches in Numismatics. He obtained degree of Doctor of Philosophy from School of Oriental and African Studies, University of London, U.K. in the year 1954. The thesis was published under the title '*The Indo Greeks*' in 1957. It is still considered as a land mark. Within six years of completing his studies, he was able to carve a high reputation of scholarship through a

number of other publications on various aspects of Indology in general and Numismatics in particular. As a result he was offered the prestigious chair of Manindra Chandra Nandi Professorship by the Banaras Hindu University, as early as 1960. Prof. Narain was invited as a Visiting Professor of Indian Studies by the University of Wisconsin in the year 1966-67. Impressed by his eminence, he was offered the position of Professor of History and South Asian Studies by the same University, where he served between 1971 and 1990.

Academic Contributions

Prof. Narain's contribution to archaeology and ancient History is extremely significant. He is one of the few eminent scholars who has had an impressive list of research publications. He has authored about two dozen books and monographs. The wide canvas of his scholarly coverage can be viewed by citing just a few of his monographs.

Dhammapad (Pali text with Sanskrit rendering and Hindi translation). Mahabodhi Society. Sarnath. 1945-46.

Coin-types of the Indo-Greek Kings (Numismatic Notes and Monographs Series No.1 of the Numismatic Society of India). Varanasi, India.1954. Reprinted by Argonaut & Co. Chicago. 1967. Third reprint. 1977.

The Indo-Greeks. Clarendon Press. Oxford. 1957. Reprinted, 1962 and 1980 by OUP.

Coin-types of Saka-Pahlava Kings (Numismatic Notes and Monographs Series No. 4 of the Numismatic Society of India). Jointly with G.K. Jenkins. Varanasi. 1957.

Prahladpur (Report of Archaeological Excavation) jointly with T.N. Roy. Banaras Hindu University. 1968.

Prachina Lipi shastra aur Abhilekhaki (A work in Hindi on Ancient Indian Palaeography and Epigraphy). Jointly with T.P. Verma. Varanasi. 1970.

Excavations at Rajghat, Part I & II, with T.N. Roy. Banaras Hindu University, Varanasi. 1976-77.

Excavations at Rajghat, Part III, with P. Singh. Banaras Hindu University, Varanasi. 1977.

Excavations at Rajghat, Part IV, with P.K. Agrawala. Banaras Hindu University, Varanasi. 1978.

Studies in Pali and Buddhism (Ed.). B.R. Publishing Corp. New Delhi. 1978.

Studies in the History of Buddhism (Ed.). B.R. Publishing Corp. New Delhi. 1978.

Studies in Buddhist Art of South Asia (Ed.). Kanak Publishing House. New Delhi. 1985.

The Tokharians, a History without Nation-State Boundaries (Rajiv Gandhi Memorial Lectures at the ICSSR-NERC, NEHU). Shillong.

The Date of Historical Sakyamuni Buddha. Delhi. 2003.

The Indo-Greeks Revisited and Supplemented. Delhi. 2003.

He has also contributed more than five dozen articles in various prestigious journals and Seminar Proceedings. A widely travelled scholar with an inquisitive zeal and research insight, Prof. Narain has studied almost all the important collections of material remains around the world– from Russia

and China on one side, to various parts of Europe, America and Australia. The themes of his publications are testimony to his wide experience and acquaintance with various branches of ancient history– numismatics, epigraphy, archaeology, Buddhists studies, political and cultural history of Asia, etc. The following list is an illustrative example of the diverse nature of his scholarship.

"The Greek Monogram and Al-Khanum-the Bactrian Greek City". *Numismatic Digest*, Vol X. Bombay 1986. Pp. 4–15.

"On the Chinese Homeland of the First Indo-Europeans" (paper presented at the 31st International Congress of Human Sciences in Asia and North Africa, Tokyo, 1983) published in *Man and Environment* 1987. Pp. 1–14.

"On the problem of the Identity of Saka Hanumavarga and Amyrgioi". *Bulletin of the Asia Institute*, Vol. I. Detroit. 1987.

"On Some Greek Inscriptions from Al-Khanum". In *Annali*, Vol. 47 (Institute Universitario Orientale). Naples. 1987. Pp. 269.

"On the Foundation and Chronology of Al Khanum : A Greek-Bactrian City". In *India and the Ancient World: History, Trade and Culture before A.D. 650* (Ed. G. Pollet and Leuven). 1987.

"Notes on some Inscriptions from Al-Khanum Afganistan". In *Zeitschrift fur Papyrologie und Epigraphik*, Bonn 69. 1987. Pp. 277–282.

"From Pre-history to History" (The General Presidential Address at the Joint Session of the Indian History And Culture Society, Indian Archaeological Society and the Indian Society of Prehistory and Quaternary Studies, New Delhi, 3rd Jan. 1986) Published in 1987.

Awards

It is therefore not surprising that Prof. Narain is the recipient of more than a dozen awards and honours. The noteworthy awards are – Dayaram Sahni Gold Medal for obtaining First position in M.A. in Ancient Indian History and Culture (1947); Chakravikrama Gold Medal awarded by the Numismatic Society of India for the best contribution to numismatic scholarship in a seven-year period (1961); President of the International Association of Buddhist Studies, Taipei, Taiwan (1990), etc. Prof. Narain visited the Peoples Republic of China for a month, on invitation by the Academy of Social Sciences of PRC, under the Distinguished Scholars Exchange Program of the National Academy of Sciences, USA (1983).

Developing Indological Studies in BHU

Along with his unparalleled individual contribution to Asian studies, his towering academic personality gets further elevated due to his envious capacity as an organizer and builder of institutions. In the capacity of the Head of the Department of Ancient Indian History Culture and Archaeology, he has built a full-fledged section of Archaeology, at the Banaras Hindu University, and initiated a number of research and teaching programmes. Besides this, the academic activities of the College of Indology were steered under his able guidance (in the capacity of its Principal) so as to develop it into a strong research and teaching institution between 1969 and 1971. Subsequently, in the capacity of the Dean, Faculty of Arts (1971–90), the mother faculty of the Banaras Hindu University, acquired its formation

and special status.

Indian archaeology in the sixties was being nurtured primarily by the Archaeological Survey of India. But it was necessary to expand the horizon of archaeology beyond the Governmental machinery. This could effectively be achieved by introducing teaching and research curriculum in the Universities. Prof. Narain, with his commitment and vision for archaeology, was aware of this requirement. As a result, a separate unit of archaeology was established at the Banaras Hindu University in the early sixties. Needless to mention that the contribution of Universities to the archaeological researches in India is admirably large and the name of Banaras Hindu University also fares as one of the leading centres.

Founding the Indian Archaeological Society

A man always full of ideas and zeal to take up awaited tasks, Prof. Narain also felt an urgent need for a Society of Indian archaeologists. Close interaction among archaeologists, which is a must for the growth of a discipline like archaeology, required a platform. He founded the Indian Archaeological Society in the year 1967 and organized its first conference, held in the year 1968, at the Banaras Hindu University. Through his personal contacts and persuasion, not only the archaeologists of Universities participated in this meeting, but slowly and gradually the officers of the Archaeological Survey of India also joined this non-governmental professional body of archaeologists. The first Presidential Address was given by Prof. H.D. Sankalia. It is through his initiative that the Indian Archaeological Society progressed from strength to strength and has reached a state that it is able to run a Centre for Research and Training in History, Archaeology and Palaeo-environment from its own premises at B-17, Qutab Institutional Area, New Delhi, with a four-storey impressive building housing a museum of its own, named, 'Indraprastha Museum of Art and Archaeology'.

Still Writing

Even at the age of eighty, he is still academically active with both of his qualities: as an organizer, he is the Founder-Chairperson of the Indian Congress of Asian and Pacific Studies since 1993, and also as an editor, he has been the Chief Editor of the Journal of the Indian Congress of Asian and Pacific Studies, from 1994 and has brought out the first issue of *Asia-Prashant*. His individual ongoing research projects include – (i) '*From Kurus to Kaniska: Chapters from A Millennium of Early History of Asia without Nation-state Boundaries*' (ii) '*Movements and Interactions of Peoples,Ideas and Institutions (Sixth Century B.C. to Fourth Century A.D.)*'. These constitute of his planned series of ten volumes, of which three volumes are already in print and four volumes are in first draft stage). He also proposes to work on three important themes : i) Kasi- Varanasi, the oldest twin cities, in the world; ii) Ayodhya – An Archaeological Report; iii) A New History of Buddhism.

Our Felicitations

The family of Indian archaeologists takes this opportunity to felicitate him on completing 80 years of his fruitful and glorious life and also wishes him several more decades of happy, healthy and productive life.



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Symbolic Approaches to the Study of Early Agropastoral Communities of Lower Deccan

K. Paddayya*

Introduction

This paper provides a brief account of my decade-long research comprising both detailed regional surveys and a major excavation concerning the ashmound sites of southern Deccan. The main results of this work have been published in the form of several research papers which are easily accessible (Paddayya 1993a,b; 1995a,b; 1998; 2000; 2002a,b; Paddayya, Thomas and Joglekar 1995). In the first section of this paper, I will give a brief summary of the results which prove that the ashmound sites represent a pastoral way of life adapted to the granitic hills and sandy soil strewn landscape of southern Deccan. In the second section, I would like to plead that the archaeological record at these sites does preserve strands of evidence which allow us to enter the symbolic world of these pioneer agropastoral communities of South India. The Neolithic pastoralists not merely explored and exploited the life-sustaining resources of the region, but simultaneously absorbed the landscape into their consciousness and gave meanings to its various constituent elements.

Recent Research on Ashmounds

Picking up from my doctoral research on the Neolithic sites of the Shorapur Doab (Paddayya 1973), and, more pertinently, influenced by the identification of extensive habitation debris around the ashmound at Budihal in 1987-88 when the area was acquired by the Karanataka Government for resettling the present village of Budihal, I explored for three seasons (1988 to 1990) all the major ashmounds sites found in the districts of Raichur, Bellary, Anantapur and Mahbubnagar. In addition to reconfirming the earlier views of Robert Bruce Foote and Raymond Allchin about the Neolithic age of these sites and their character as accumulations of burnt cowdung, these studies revealed the following additional features: 1) concentration of sites in the hilly tracts occupied by the Archaean granite formations which support plentiful pasture but are ill-suited for agricultural purposes on account of thin and sandy soil cover; 2) their location close to perennial water sources as formed by small or big rivers, nullahs with perennial water pools and natural springs; and 3) occurrence of thick and extensive habitation deposits around ashmounds yielding rich Neolithic cultural material. Thus, contrary to the distinction made by Raymond Allchin (1963) between settlement sites and ashmounds, these fresh field studies suggested that these sites are full-fledged Neolithic pastoral settlements. With a view to verifying this proposition, I undertook a major excavation at the site of Budihal (Gulbarga district, Karnataka) for six seasons (1990-91

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to 1996-97).

The Budihal site is located on a sandstone plateau and is defined on two sides by deep ravines containing perennial water pools. It measures 400 m north-south and 300 m east-west. Four localities were recognized on the site, each consisting of an ash deposit and habitation debris rich in the Neolithic cultural material. Budihal has also preserved an extensive chert workshop and a cluster of grinding grooves formed on sandstone blocks forming a part of the ravine on the eastern side.

Among the four localities, Locality I is the largest and best preserved one. It covers a total area of 1.84 ha. The ashmound is located in the centre of the site and consists of two parts: a) upper ashmound (2000 m. in extent and 3 m. in height) and b) lower part comprising of many thin layers of decomposed cow-dung and fine ashes (altogether less than a metre in thickness) covering an area of 3000 sq m used for cattle penning. Trench 1 (60 m long and 1 m wide) was excavated in the upper ashmound and exposed various strata made up of decomposed cowdung and vitrified and soft varieties of ash. These deposits resulted from dumping of cowdung cleared from cattle penning area and periodic burning.

Trench 8 was excavated in the lower ashmound and exposed a cattle penning area measuring about 900 sq.m. in extent. It was enclosed by sandstone rubble embankment measuring 2 to 2.5 m wide and 50 to 65 cm high. This rubble base was covered with a thick mass of thorny matter. Such rubble-cum-thorn brush enclosures are still being used for cattle penning in the Budihal area.

In the human settlement area surrounding the ashmound, five trenches (Trenches 2,4,5,6 and 7) covering a total area of 550 sq.m., were excavated. The habitation deposit had a thickness of 50 to 60 cm. It is probable that originally the deposit was thicker by at least 20 to 30 cm and has been stripped away in recent times due to soil erosion. Four layers were exposed in the excavation:

Layer 1 Light grey soil (15 to 20 cm thick) representing the plough zone and rich in Neolithic cultural material.

Layer 2 Typical greyish habitation soil (20 to 25 cm thick) constituting the main Neolithic horizon.

Layer 3 Greyish brown soil (5 to 10 cm thick) representing the basal phase of Neolithic occupation.

Layer 4 Natural soil, as formed by sandstone surface.

Trench 4 was the largest one (307 sq m in extent) excavated in the settlement area and gave evidence of eight structures. Two of them were non-residential in character (one a workshop of chert blade industry and the second a storage place for pottery). The remaining six structures were round or oval in shape and their architecture closely resembles the huts which one still sees in the area. An animal butchering floor was found in Trench 5 (total extent 129 sq m), but the original floor would have covered an area of 250 sq.m. This floor rested on a hard layer made up of a mixture (2 to 5 cm thick) of rammed kankar-like material and fine ash. The butchering floor itself measured about 5 cm in thickness and yielded a faunal assemblage comprising skull and jaw pieces, ribs, long bones, etc. of cattle, buffalo and other animals. This trench yielded little or no pottery but produced many chopping tools of dolerite, hammerstones and chert blades.

Geoarchaeological studies showed that the sandstone plateau, as occupied by the Neolithic groups, was a flattish surface with a thin brown soil cover (Khrisat 1999). The faunal material recovered from the settlement area, comprising of 15 species, included domestic species such as cattle, sheep/goat, buffalo and chicken. The plant material recovered by flotation technique contained carbonized grains of domestic barely, horsegram and Indian bean and also evidence of three wild plant species (Indian jujube, Indian cherry and emblic myrobolan).

The above-mentioned observations exemplify a hard or New Archaeology approach to the archaeological record

and the ashmound sites surely constitute an excellent example of adaptation of a cattle dominated pastoral community to a rugged landscape with semi-arid climate. Pastoralism was indeed the best insurance for a stable mode of life in this landscape setting.

Symbolic Approaches to the Neolithic

I would now like to explore whether we can rise above this level and adopt what may be called a soft approach to the ashmound sites. What I mean to say is that these sites could be treated as texts which allow us insights into the minds of Neolithic pastoralists. The peasants in South India, as everywhere else in the country, treat the landscape on which they carry out their various daily activities as both enabling and ennobling. The landscape is not merely seen as geographical space for satisfying their material needs but treated with a sense of reverence and gratitude. This is reflected in the worship of plants and animals as well as agricultural implements and sanctification of hill ridges, caves and rock-shelters, and water sources like springs. Films like *Mother India* and writings like Pearl S. Buck's novel *The Good Earth* immortalize this spiritual orientation to the landscape prevalent among the Oriental communities.

Raymond Allchin already initiated such an approach to the study of ashmound sites in his book *The Neolithic Cattle-Keepers of South India* (1963), which is a landmark publication in Indian archaeology after independence. Allchin not only brought together archaeological evidence pertaining to all important ashmound sites including his own excavations at the site of Utnur, but also gathered a variety of ethnographic data pertaining to place-names, traditional interpretations of ashmound sites current among modern village communities and pastoral elements as reflected in folk religion. Disagreeing with Robert Bruce Foote's interpretation of burning of cow-dung accumulations due to chance and carlessness of people, Allchin maintained that the burnings were intentional and were part of a Neolithic ash-fire cult, aimed to promote cattle fertility.

It is possible to further extend this soft approach to the ashmound sites and post-processual archaeology provides a useful perspective for this purpose. Taking clues from his own work on the pastoral communities of East Africa and the meaning-impregnated character of their material cultural items (Hodder 1982), Ian Hodder, in his book *The Domestication of Europe* (1990), has sought to interpret the entire Neolithic sequence in Europe as the playing out of a long-term structure which underlies architecture, burial practices and artifact styles. This structure, according to Hodder, involves an opposition between the *domus* (house and domestic world) and the *agrios* (wild) and consists of a set of rules or codes gradually spreading across Europe.

Subsequently, several other workers dealing with the British Neolithic have come up with their own particular orientations within this soft framework. In his books *Rethinking the Neolithic* (1991) and *Time, Culture and Eternity* (2001), Julian Thomas adopts a hermeneutic approach and argues that the introduction of Neolithic way of life was not mere adoption of a Neolithic trait into the Mesolithic way of life. It was a wholesale transformation of social relations resulting from the adoption of an integrated cultural system. In his own words: "Such a system has its purpose in not merely provision of sustenance, the biological reproduction of the community, but its social reproduction including the maintenance of power relations, knowledge and institutions. Owning a cow or an axe, living in a house, or burying one of one's kin in a particular way does not make a person Neolithic. It is the recognition of the symbolic potential of these elements to express a fundamental division of the universe into the wild and the tame which creates the Neolithic world" (Thomas 1991: 13). Thomas has considered at length the application of this symbolic or social approach to various materials such as monuments, ceramics, lithics, and animal and plant materials. He also postulates that a great degree of variability existed between different areas in Britain in terms of social and cultural practices.

Christopher Tilley's book, entitled *A Phenomenology*

of Landscape (1994), is an attempt to introduce elements of humanistic geography into interpretation of landscapes of past societies. In the past, landscape was regarded as mere physical compass or container for action. The phenomenological perspective argues that space was more than a silent container for action and it cannot just be considered apart from events and activities within which it is involved. Tilley treats landscape as a series of locales or sets of relational places linked by paths, movements and narratives. Thus, landscape in which a community is located is not a passive three-dimensional entity but is a cultural world which in turn shapes the human mind.

Ancestral Geographies of the Neolithic by Mark Edmonds (1999) is another book which attempts to recapture the social world of Neolithic communities of Britain during the fourth millennium B.C. Making use of evidence pertaining to landscape and monuments, Edmonds visualizes the Neolithic Britain as a world shaped by kinship, ancestry and other forms of affiliation. In this world, the dead were a powerful presence and distant times and places held a particular fascination for the people. These themes were brought into a sharp focus at the time of periodic gatherings at monuments, enclosures and tombs. At these gatherings, the community engaged in ancestral rites, exchange and other forms of ceremonial activity. It was through this routine as well as ritual experience that dispersed and fragmented communities not only kept their bonds with one another strengthened but also promoted ties with the land and their past.

Application to Ashmounds

These approaches currently being employed in the studies dealing with the European Neolithic and Bronze Ages have clear-cut implications for the South Indian Neolithic. Considering my earlier observations that the rural way of life in South India is an amalgam of both function-oriented and meaning-giving attitudes of the local community, it is very tempting to postulate that some of the elements of this framework of meaning imputation could have already come up in the Neolithic phase of the region's past.

The evidence obtained from the Budihal excavation may be cited for consideration. This excavation exposed 13 human burials which belong to sub-adults or infants (Pl.1). These burials were found either in the habitation area or in cattle penning/cowdung disposal areas. Several of them had simple funerary articles such as chert blades and animal bones. In one case, a child of 7 or 8 years was buried with a hammerstone and a set of half a dozen well-struck chert blades. These burials and their placement within the precincts of site serve as a symbolic link between the past and the present. So far as the archaeological record of South India is concerned, it is only from the Neolithic period onwards that we begin to get evidence of human burials symbolizing respect and affinity to the dead including infants.

Another set of evidence relates to finding of 4 or 5 cases of intentional deposition of animal remains. These included a cattle skull, a leg bone of a calf, jaw bones of cattle, jaw bones of sheep/goat and a collection of rib and leg bones of cattle (Pl. 2 & 3). These depositions were purposely made, indicating that the domestic animals too entered the consciousness of people and that close bonding developed between people and animals.

The third piece of evidence concerns a small rubble platform found on soft cowdung in the centre of the cattle enclosure exposed in the lower ashmound area. This platform measured about 9 m in extent and all around it there was evidence of burning with a scatter of faunal material and chert blades. It would seem that some ceremony or ritual including feasting took place at this spot. It is possible that this event marked the end of one phase of occupation of the pen and the burning of degraded thorny matter forming part of the rubble embankment and cow-dung material remaining from clearance.

The long trench excavated in the upper ashmound exposed some depositions of animal bones, human bones and cultural material (Pl. 4). These depositions suggest that the spot earmarked for cow-dung disposal and burning was not regarded as something impure and left beyond the purview of site activities. On the contrary, it was an active

and, may be in some cases, a preferred focus of human activity. The ethnographic present from the region tells us that garbage dumps border upon dwelling houses in many cases. The farmers not only proudly point to the large sizes of their garbage dumps, but use the space on them for gossip and narration of stories as well as for practical purposes like keeping agricultural implements after the day's work.

In my view, the ashmounds played a vital role in the Neolithic life-world in another important way too. If they so desired, the Neolithic folk could have deposited the cow-dung cleared from the enclosure as scatters around it. Far from being erratic in their behaviour, they expended some labour and accumulated it at one spot. This obviously involved a considerable amount of community effort such that the whole deposit comprising both decomposed cow-dung and ash levels resulting from its burning emerge from the ground as a distinct marker of site landscape. This is best seen at sites like Kudatini, Wandalli, Kakkera and Eachanal where the mounds are preserved in relatively less disturbed condition. What I want to say is that, without really meaning so, the Neolithic people raised monuments from garbage disposal. I made this proposition more than a decade ago (Paddayya 1993:597). Recently, this idea has been taken up and elaborated upon by an American archaeologist (Johansen 2004). The monumentality of these mounds would have promoted a sense of site identity among the inhabitants. Further, using present-day fairs as a parallel, it is even possible to visualize that some of the major ashmound sites, like Budihal witnessed periodic regional congregations of the Neolithic people, where both functional and ceremonial transactions took place. Such congregations would have served to foster cultural identity among groups scattered over different sites in a given area.

In a recent paper, Nicole Boivin (2004) of Cambridge University has emphasized the need for fresh studies concerning ritual and symbolism in the context of South Indian Neolithic culture. She has further proposed that the ashmounds contain clues for reconstructing the 'world view' or cosmology of the Neolithic community. She believes that the locational settings of the ashmounds at Kudatini and Toranagallu near Bellary, in addition to environmental factors, were influenced by considerations of significant views, patterns of inter-visibility, local solar events and cardinal directions.

Thus the landscape occupied by the Neolithic people was a culturally inscribed one. Ashmounds were prominent markers of this culturally altered space. Sanctified hill ridges, caves and rock shelters, water sources, rock-art stations and resource-rich landscape patches would be other markers of this culturally inscribed landscape. The meaning-impregnated character of the South Indian landscape as we see it today had its origins in Neolithic times.

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Pre-Harappan Village Settlements and Early Farming Communities in Northern South Asia (c. 9th-4th millennia BC)

B.R. MANI*

Archaeological investigations, carried out in the Post-Independence period in the Indian subcontinent have shed light on origin and growth of civilization from Indo-Iranian borderlands on the west through Kashmir and dried up river bed of Sarasvati-Drishadvati divide to the Ganga plains on the east. In this large geomorphic area diverse cultures in separate geographical units or pockets emerged from ca. 9th millennium BC onwards. These developed through the 7th-6th millennium BC and continued to flourish until the end of the fourth millennium BC when this process culminated into the foundation of Great Harappan Cities.

The region dominated by the Indus-Sarasvati-Ganga system witnessed human activities connected with domestication of sheep, goat and knowledge of wild varieties of grains in the 7th millennium BC, indicating the beginning of a settled life pattern which gradually developed into well-settled cultures of rural communities using pottery in the 6th millennium BC. By this time, they had already domesticated several grains and plants and also animals. The study of lake-core profiles, cultural elements and various radiocarbon and other scientific dates attest it.

Indus-Baluchistan Region: Significant Data

After classification of the archaeological material and fresh data along with scientific dates from northwestern regions of South Asia, B.B. Lal (1997:32-91) has discussed the antecedents and birth of the earliest civilization in detail. Two uncorrected C^{14} dates (8565 ± 240 BC and 6960 ± 105 BC) from the Neolithic aceramic levels at Aq Kupruk (Dupree 1972; Shaffer 1978) along with evidence of domestication of sheep and goat followed by pottery-bearing levels having four dates, viz., 5806 BC, 5638 BC, 5292/5286/5241 BC and 3307-3110 BC (Possehl 1990:3-4) have clearly indicated the existence of ceramic Neolithic phase in the 6th millennium BC. This has been further confirmed by evidences from Mehrgarh. However, the evidences from other sites of the region such as Kile Gul Mohammad, Gumla, Rehman Dheri and Nausharo near Mehrgarh have not only provided a detailed picture of aceramic Neolithic stage going back to the 7th millennium BC, followed by ceramic Neolithic and other cultures up to the 2nd millennium BC, but have also corroborated and confirmed evidences from each of them.

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The earliest settlement of MR-3 at Mehrgarh, in the piedmont area adjacent to the Indus plains (Jarrige 1981, 1982, 1984, 1986, 1988, 1989; Jarrige and Lechevallier 1979; Lal 1997:34-48) was an aceramic Neolithic culture dominated by stone and bone tools including polished axes, adzes, chisels, microlithic parallel-sided retouched blades, borers, scrapers, triangles, trapezes, lunates and micro-borers and bone awls. The 10 m Neolithic deposit with its lower three-fourth levels (Period IA) being aceramic, the upper one-fourth has coarse ware pots with basket impressions and evidence of domestication of animals – sheep, goat and cattle.

The West Asian Neolithic does not have cattle as a prominent domesticated animal, as it is at Mehrgarh alongwith water-buffalo (*Bos bubalis*) domesticated for the first time. Varieties of wheat and barley, including emmer wheat (*Triticum dicoccum*) and fruits like jujube and dates comprised the early Neolithic dietary. The size of mud-bricks was 28 x 14.5 x 7 cm and 33 x 14.5 x 7 cm, the former in the ratio of 4:2:1, which is the typical mature Harappan ratio, a significant continuity of tradition. Another important feature is the burial practice; the burials were away from the houses and not beneath the residences as in South Indian Neolithic tradition. Bodies were placed in extended or flexed positions and were sometimes covered with red ochre, the lumps of which are also found in some graves. Similar practice was followed in Kashmir Neolithic, as seen on human skulls and bones applied with red ochre at Burzahom (Saar 1992:37). Interestingly, a copper bead of great antiquity was found in a burial, which is quite surprising in the aceramic Neolithic context. Stone vessels were found in this phase. The eight consistent radiocarbon dates for MR IA and B show that Period I at Mehrgarh would be around 6000 BC and the end of it could be around 4500 BC.

The hand-made, basket-impressed coarse ware of Period IB gradually increased in the Sub-period IIA and was better fired in IIB. Sub-period IIC witnessed the introduction of wheel-made pottery having affinity with Period II at Kile Gul Mohammad and Mundigak in Afghanistan (Lal 1997:37-38). Stone axes and adzes decrease in number, but blades, bladelets and bone awls increase. Ivory and copper were also present along with terracotta human figurines. Period II has been placed between 4500 BC and 4000 BC. Painted designs, especially depiction of birds and animals in rows, increased on pottery of Period III at Mehrgarh, which has been placed in the first half of the fourth millennium BC when large granaries were made.

Period IV has been assigned the date 3500-3000 BC and the short-lived Period V around 3000 BC. A single radiocarbon date of 2470 BC from Period VI helps in understanding the explosion in pottery indicating interactions with sites of Baluchistan, Afghanistan, Iran and the Indus plains. The excavator has assigned middle of the third millennium BC (based on pottery) to Period VII representing the "Zhob style" terracotta figurines, mother goddesses and large mud-brick platforms. This phase has pottery similar to that from Kot Diji, Amri (II B), Mundigak (IV), Shahr-i-Sokhta (II & III) and Harappa. Period VIII at Mehrgarh had a culture similar to the late Harappan. The nearby site Nausharo was occupied for the first time around the end of Period VI of Mehrgarh and yielded typical Mature Harappan pottery from its Period II along with pots bearing characteristic signs of Harappan script.

Heavy burning activity is found in Period ID at Nausharo, which is also encountered at Kot Diji between Kot Dijian and Harappan levels. This has been interpreted by many scholars as an indication of probable invasion by Harappans to burn down the earlier settlements of Kot Diji phase before settling there. The intervening layer containing ash, charcoal and potsherds between periods III and IV at Gumla also signifies the burning activity at the site before it being occupied by the people of Mature Harappan phase who settled with the earlier inhabitants.

Earlier excavations in Northern Baluchistan at Rana Ghundai and Dabar Kot had already yielded similar material, the former with its Period I, characterized by flint

blades, points and eyed needles of bone and plain handmade pottery, bones of cattle, sheep and ass, assignable to the late Neolithic stage. Period II at Rana Ghundai has wheel-turned red ware. Dabar Kot had yielded a lot of typically Mature Harappan material from the middle levels with terracotta figurines of the region suggesting intercommunication of cultures.

About 15 km west of Kile Gul Mohammad, Damb Sadat has yielded a variety of painted pottery from Period I representing Kechi Beg Ware, which appears at Kile Gul Muhammad (Fairservis 1956) in Period IV. Quetta Ware, Quetta Wet Ware, Faiz Muhammad Grey Ware represent Period II and Sadat Ware of Period III is contemporary with the Mature Harappan phase. Kalat, Togau, Anjira, Sohr Damb, Nal, Kulli, Nindowari, Mehi are other sites in the area. Although Nindowari essentially represents Kulli culture, two seals with Harappan characters and unicorn motif suggest its contemporaneity for some time with the Harappan civilization.

Gumla and Rehman Dheri are two sites in the Gomal Valley near Indus, which have interesting culture-sequence. At Gumla (Dani 1970-71), Period I is characterized by variety of microliths, saddle-querns, mullers and pestles, but without polished tools, metals and pottery and is considered to be aceramic Neolithic. Period II shows presence of copper-bronze objects, wheel-turned pottery, stone and bone tools, terracotta human and animal figurines etc. After a gap, the next occupation of Period III has mud bricks of 28 x 13 x 7 cm in the Harappan ratio of 4:2:1, but the painting of thick bands along the rim and neck and 'horned deity' motif put this phase with Kot Dijian along with radiocarbon dates of circa 2700-2800 BC. Separated by the ashy layer, the next period is Period IV, which contains many characteristic features of mature Harappan elements in pottery, terracotta toy carts, triangular cakes, wheels, large podium of mud-bricks etc.

'Horned deity' is also depicted on pottery of Period I at Rehman Dheri (Durrani 1981a, 1981b, 1988 and Durrani et al. 1991). Here the local manufacture of ring-based bowls and cups of fine red ware are found in association with the pottery of Kot Dijian type. The ivory seal with two holes along one edge and engraving of two mountain goats and two scorpions and a frog is an interesting find (Lal 1997: 56-57). The C^{14} dates put the period around 3000 BC, contemporary to Period IV at Mehrgarh. Period II yielded typical Kot Dijian pottery and Period III has material closer to the typical Harappan.

The Kot Dijian culture survived at the sites in the Bannu basin at the Sheri Khan Tarakai in the late Neolithic complex datable around 4500 BC and at Tarakai Qila and Lewan in a later time frame.

The impressive mound Sarai Khola (Halim 1970-71, 1972), which may be considered as a part of Taxila, is about 2.5 km from the Bhir mound. The radiocarbon dates for Period I ranging around 2800-3000 BC and the traditionally known antiquity of Taxila requires further investigation. The Period I, with polished stone axes, chert, flint blades and other microliths, bone points, burnished ware with brown surface having pans and bowls, the latter being mat-impressed at the base, remind one of the Neolithic culture of Kashmir with which it is contemporary. Similarly, Period II of Burzahom also shows continuity of an earlier culture with the introduction of Kot Dijian elements and female terracotta figurines with thin waist and broad hips reminiscent of those found at Gumla and Rehman Dheri and copper-bronze objects. At Burzahom, the C^{14} dates range around 2200 to 2500 BC, though Mature Harappan culture is absent. Jhang near Sarai Khola (Lal 1997:59-60) has also yielded Kot Dijian material.

Later excavations at Harappa have brought to light details of phases prior to mature Harappan period and belonging to the Kot Diji – related period. For the earliest deposits, the C^{14} date of 3338 to 3202 BC (Lal 1997: 61) indicates the beginning of civilization in the middle of the fourth millennium BC.

While Jalilpur (Mughal 1972) represents a cultural phase contemporary to the pre-Mature Harappan period, the earliest levels at Mohenjodaro remain enigmatic due

to high water-table. The 5 m thick deposit below the Mature Harappan culture deposit at Kot Diji (Khan 1965) manifests into various characteristics of cultural elements called Kot Dijian including the terracotta cakes, 'horned deity' motifs etc. and the beginning of the culture is believed to be around 3000 BC. The beginning of Amri culture (Majumdar 1934; Casal 1964) based on radiocarbon determinations has been placed along with that of Bala Kot in the middle of the fourth millennium BC (Lal 1997:68).

Recently, deposits of two periods, prior to the mature phase of Harappan culture, have been noticed at Harappa with 3 to 4 m thick deposit of Period I. Handmade pottery was found with blades made on chert from Baluchistan and objects of marine shells from Makran Coast and graffiti with Harappan script in Period II suggesting the roots of Harappan civilization going back to ca.4000 BC (Lal 1997:91).

Some Japanese scientists have taken up the study to understand more about the formation process of the Harappan civilization by focussing on complex regional interaction that is reflected in manufacturing techniques of not only pottery, but also of stone tools of the Kot Dijian assemblage, starting with the excavated material of Gumla and Rehman Dheri (Kondo et al. 2005).

Kashmir Neolithic: New Evidence

The knowledge about Neolithic culture in Kashmir is based on excavations at three sites: Burzahom, Gufkral and Kanishkapura (Kanispur). Still there are a number of other unexcavated Neolithic sites. Burzahom was excavated by T.N. Khazanchi for seven seasons (1960-1971); Gufkral was excavated by A.K. Sharma for two seasons (1980-1982) and Kanishkapura was excavated by the present author for one season (1988-99).

Kanishkapura or modern Kanispur (34°13'35" N; 74°24'30"), a prolific Neolithic and historical site in the Baramulla District of Kashmir, was excavated by the author in 1998-99 while working as Superintending Archaeologist of the Srinagar Circle of the Archaeological Survey of India (Mani 2000).

The Neolithic remains were excavated in KNP-1 and KNP-2 areas, while the historical remains beginning with Kushan period were found in all the three excavated areas, i.e. KNP-1, KNP-2 and KNP-3. It has been revealed that, after the Neolithic settlement, the site was reoccupied only during the Kushan period when Kanishka seems to have established a city in his own name as mentioned in the *Rajatarangini* of Kalhana (Stein 1990/1979:30-31). Unlike Burzahom and Gufkral, the site does not have any evidence of a megalithic culture.

At Kanishkapura, evidence of aceramic Neolithic (Period I) was found to be only 15 to 20 cm thick in layer 8 overlying the natural soil at KNP-1 which is bereft of any ceramic industry. From this layer a polished stone celt was found. The average thickness of the ceramic Neolithic (Period II) levels at KNP-1 and KNP-2 was found to be 1.60 to 2.0 m. It has been inferred that the Neolithic population settled on the flat top of the Karewas at KNP-1, and later, after enlargement of their settlement, they occupied the slopes at KNP-2. Four successive floor levels along with post-holes were noticed at KNP-1, which are a part of the rectangular houses. The houses most probably had thatched roofs. Five bone points and six polished stone celts were recovered during excavation. The ceramic industry comprised of both handmade as well as wheel-turned pottery. Fine grey ware of medium to thick fabric, coarse grey ware, red ware, dull red ware, black wares of both plain and burnished varieties are the important types. Evidence of brushing the wet surface of pots with reeds and mat-impressed designs on the disc bases of pots has been found. Pinched designs on appliqué bands and incised oblique decorations on the neck and rims of hand-made vases were frequent. Similar decorations are also found on the body of the pots. Series of deep incised lines, notching and semi-perforated decorations were noticed on stems or stands of pottery, particularly on dish-on-stand. The important shapes include bowls, shallow bowls, or dishes-on-stand, jars, vases and long-necked vases.

The evidence of copper objects in the form of a bangle piece, a needle, two pins, an ear or nose ring and a chisel from the late Neolithic levels at Kanishkapura suggests chalcolithic contacts, probably with the Harappans, as also found in similar levels at Burzahom and Gufkral (Mani 2000:5; Ghosh 1989:88; IAR 1981-82:23).

Excavations at Kanishkapura have given the evidence of emmer wheat (*Triticum dicoccum*), mingled with barley; emmer wheat and barley are also found mingled from Early Harappan deposits at Kunal in District Hissar (Haryana). Emmer wheat (Saraswat and Pokharia 2003: 109) has also been reported from the mature and early phases of Harappan settlement at Rohira in Punjab. In the evolutionary stage, emmer wheat, which is a product of a highly arid zone, seems to have come to Kashmir from the Middle East through Central Asia via Iran, Afghanistan and Mehrgarh.

At Kunal, the excavations in trench WC 2, Qd. III yielded a dwelling-pit (diameter 2.40 m; depth 1.50 m) which cuts through layers 5 and 6, with fire activities inside the pit. Plaster with fine clay mixed with whitish material justifies its actual use. An interesting discovery from this pit comprised of a small ring stone of Neolithic tradition (IAR 1995-96: 24). Thus it seems that below the Pre- or Early Harappan levels at sites in the Punjab-Haryana-Rajasthan-Gujarat region or beyond in Pakistan, there can be located a level which is either pure Neolithic which merged into the new Chalcolithic traits and gave rise to the early Harappan culture. Evidence from Mehrgarh partially suggests this. Contact of Harappans continued with the Kashmir Neolithic which remained isolated from the direct impact of the new development of an urban civilization that spread in a large area to the south of Kashmir. Depiction of 'horned deity' on a pot and abundance of carnelian beads at Burzahom also suggest contact with Kot Dijians or Pre- or Early Harappans.

The new evidence of radiocarbon dates from Kanishkapura (Mani 2004: 142) suggests the beginning of Neolithic age in the middle of the fourth millennium BC with ceramic Neolithic appearing in the late fourth millennium BC in Kashmir and not in the first half of the third millennium BC as popularly believed by archaeologists on the evidence of Burzahom and Gufkral. A calibrated C^{14} date of one charcoal sample from Kanishkapura is 3361 BC to 2937 BC (average being 3149 BC). Table below also gives details of C^{14} dates as determined by Tata Institute of Fundamental Research, Bombay and Birbal Sahni Institute of Palaeobotany, Lucknow based on radiocarbon half-life value of 5730 ± 40 years.

The radiocarbon evidence suggests movement and development of the Neolithic culture in the Kashmir valley. It seems that Central Asian Neolithic Tradition entered the Kashmir valley in the second half of the fourth millennium BC, when the Neolithic settlers occupied the western part of the valley around Kanishkapura and then moved towards Central Kashmir, as the dates from Burzahom indicate the occupation around 2881 BC onwards. The Neolithic settlements occupied further southeastern part of Kashmir, in about 2347 BC onwards, around Gufkral. It was during

Uncalibrated and Calibrated C^{14} Dates from Three Neolithic Sites of Kashmir:

I. Burzahom

Sample No.	Material	Period	Un-calibrated	Calibrated	
TF.123	Charcoal	IA - Neolithic	4095±110 BP	225±125 BC	2586 BC
TF.13	-do-	-do-	3690±125 BP	1850±130 BC	2130, 2074 BC
TF.127	-do-	IB - Neolithic	3935±100 BP	2105±115BC	2465, 2343 BC
TF.14	-do-	-do-	3860±10 BP	2025±350BC	2343 BC

TF.129	-do-	Neolithic	3670±90 BP	1830±95 BC	2114, 2080, 2039 BC
TF.15	Burnt organic material		IB - Neolithic	3390±105 BP 1540±110 BC	1730, 1729, 1689 BC
TF.10	Charcoal	Neolithic	2580±100 BP	705±105 BC	797 BC
TF.128	-do-	IB - Neolithic	4205±115 BP	2380±120BC	2881, 2757, 2783 BC

2. Gufkral

Sample No.	Material	Period	Un-calibrated		Calibrated
BS 357	Wood charcoal	IB - Neolithic	5369±105 BP	1520±110 BC	1681 BC
BS 431	-do-	II - Megalithic	3466±85 BP	1620±90 BC	1884-1677 BC
BS 433	Charcoal	-do-	3612±105 BP	1770±110 BC	2131, 2077, 2047, 1871, 1841-1779 BC
BS 434	-do-	-do-	3680±105 BP	1840±110 BC	2195-2151 2149-1900 BC
BS 359	Wood charcoal	IB Neolithic	3864±115 BP	2030±120 BC	2347 BC
BS 356	-do-	-do-	3466±105 BP	1620±110 BC	1860,1847, 1770 BC
BS 370	-do-	IC - Neolithic	2709±105 BP	840±110 BC	842 BC
BS 371	-do-	-do-	3466±95 BP	1620±110BC	1860,1847, 1770 BC
BS 358	-do-	IA - Aceramic Neolithic	3039±105BP	1180±110 BC	1313 BC
BS 360	-do-	IC Neolithic	3243±95 BP	1390±110BC	1519 BC

3. Kanispur (Kanishkapura)

Sample No.	Material	Period	Un-calibrated		Calibrated
BS 2058	Charcoal	Ceramic Neolithic	3970±90 BP	2020±90 BC	2470 BC
BS 2055	-do-	Ceramic Neolithic (close to aceramic)	4490±100 BP	2540±100 BC	3361 BC to 2937 BC (Average 3149 BC)
BS 2056	-do-	Ceramic Neolithic	3970±90 BP	2020±90 BC	2470 BC

this phase when chalcolithic contacts might have developed between the Neolithic settlements of Kashmir in the north and the Early and Mature Harappan Civilization in the Punjab-Haryana region in the south.

This is indicated by the contemporaneity of an Early Harappan settlement at Manda (Akhnur) in Jammu on the right bank of the Chenab and a Neolithic site, Malpur (excavated during 1994-96), located very close to the former, but on the opposite bank.

Palaeobotanical studies (Saraswat *et al.* 2004 a) have brought out thirteen kinds of grains, seeds and fruits from Neolithic deposits at Kanispur (Kanishkapura), dated from about 3000 BC to 2000 BC. Hulled and naked forms of barley (*Hordeum vulgare* and *H. vulgare var. nudum*), breadwheat (*Triticum aestivam*), emmer wheat (*Triticum dicoccum*), lentil (*Lens culinaris*), fieldpea (*Pisum arvense*) and grass pea (*Lathyrus sativus*), which constituted main ingredients in the agricultural economy during Neolithic-Chalcolithic times in the Mediterranean zone and which were disseminated in the Kashmir Valley from the regions where we may expect the Neolithic people to have received cultural influence. Almond (*Prunus amygdalus*) and walnut (*Juglans regia*) evidenced by their fruit shells, acquired the dietary preference. Common vetch (*Vicia sativa*), a common weed in pulse-crop fields; morning glory (*Ipomoea* sp.); poppy (*Papaver* sp.) and alfalfa (*Medicago cf. lupulina*) have also turned up in the carbonized material examined.

Sarasvati-Drishadvati Divide: Towards Harappan Urbanism

The palaeo-climatic studies along with environmental sequence (Jagannathan *et al.* 1964:434) as deducted from the vegetation history and stratigraphy of the lake basin deposits concerning the Holocene epoch have suggested the following five phases (Lal *et al.* 2003:8) in Rajasthan:

While phases I to III indicate respectively severe arid, wetter with more rainfall and slightly lesser humid conditions, Phase IV signifies a sudden change to wetter conditions with maximum wetness lasting up to about 1800 BC when the Early and Mature Harappan culture flourished in Kalibangan. The earlier wetter phases congenial to development of cultures have remained enigmatic, although a C^{14} date from Kalibangan being 6700±130 BP, or around 5200 BC on calibration, have been discarded by the excavators (Lal *et al.* 2003:25-26), maintaining it to be too early to be accepted, though suggesting some human activity.

The Landsat imagery (Ghosh and Hussain 1979; Yashpal *et al.* 1980) combined with hydrological and other field investigations, aerial photography and studies related to palaeo-channels and tectonic movements in the Himalayas, Punjab, Haryana and Rajasthan have provided ample evidence of phases of flooding and drying up of Sarasvati and its tributary Drishadvati. On various considerations the early Haruppan period at Kalibangan has been assigned to circa 3000 to 2700 BC and mature Harappan Period to circa 2550 to 2000 BC (Lal *et al.* 2003:23-26). The pre-Harappan ceramic industry called Sothi culture was confirmed in the excavations at Sothi and Nohar by revisiting the sites earlier explored by Ghosh (Dikshit 1980:32-43). Significant enough are C^{14} dates

Phase I	Before Circa 8000 BC	Severe arid
Phase II	Circa 8000 – 7500 BC	Wetter with more rainfall
Phase III	Circa 7500 – 3000 BC	Slightly lesser humid
Phase IV	Circa 3000 – 1000 BC	Sudden increase in rainfall
Sub-phases	(A) 3000 – 1800 BC(B) 1800 – 1500 BC(C) 1500 – 1000 BC	Maximum wetness upto 1800 BC
Phase V	Early centuries (CE) to the present	

from the charcoal samples from the recent excavations at Bhirrana, an early Harappan settlement in Fatehabad Tehsil of District Hissar in Haryana (the dates are communicated by K.S. Saraswat, Birbal Sahni Institute of Palaeobotany, Lucknow). They conform to the radiocarbon dates from Mehrgarh to the west and Lahuradeva to the east as ranging between the fifth to the seventh millennia BC indicating considerable human activity in the region. Three other dates range between second and third millennia BC when early and mature phases of Harappan occupation of the site is confirmed besides one recent date which may be because of mixing of charcoal from the top level of Muslim graves in the early deposit due to later pit activity.

It is imperative to reconsider the chronological aspect of the sequence of early cultures at Bhirrana, where the deposits have been classified by the excavator into three cultural periods, namely, early, transitional and mature Harappan periods respectively (Rao et al. 2004). The so-called Early Harappan levels (1.70 to 1.80 m thick deposit) have shown several traits of the Hakra element and Neolithic or proto-Neolithic culture which include lesser use of copper and subterranean dwelling (Pits cut into the natural soil), a practice common in Kashmir Neolithic. The dwelling pits with mud-plastered inside walls have an average diameter of 2.30 m. These are mostly circular at Bhirrana with occasional brick lining of irregular shaped bricks. These bricks, in the words of the excavator himself, 'do not conform to the known ratio of the Early Harappan brick sizes' (Rao et al. 2004). Such practice in Early Harappan context can be seen at Mitathal (Suraj Bhan 1975:12) and at Kunal (IAR 1991-92: 37-39). The discovery of stone pounders and mullers make it significant. Earlier, at Early Harappan sites like Kunal and Rohira, emmer wheat (*Triticum Dicoccum*) and ring stones found in the earliest deposits had already suggested contacts with Neolithic cultures. This evidence is further strengthened with the finding of emmer wheat in Kanispur from Neolithic levels, besides at Mehrgarh. All the six fabrics of Early Harappan pottery of Kalibangan are found at Bhirrana. The C^{14} dates of the second season's excavations, sent to the Birbal Sahni Institute of Palaeobotany, Lucknow, are awaited (personal communication), which may throw new light on the emergence of the Early Harappans in this region. Also all the six fabrics of Kalibangan I and stylized depiction of 'Horned Deity' of Kot Dijian type (on fabric B) is found.

In Gujarat, Nagwada, Prabhas Patan (Somnath) with its dates 2911 BC and 2892 BC (Possehl 1990:41) and Padri with its two C^{14} dates of 3048 BC and 3680 BC (Shinde 1992a and 1992 b; Sonawane and Ajithprasad 1994) are noteworthy pre-Harappan sites.

Ganga Plains : Rise of Early Farming Cultures

Recent archaeological investigations in the Middle Ganga Plains have significantly enriched the knowledge and understanding about archaeological sites, material culture and chronological sequence of the region. The landscape consists of flood alluvium brought down from the Himalayas in the north through the Ganges and its tributaries, which have also formed numerous ox-bow lakes in their meandering courses. These features have provided a congenial habitat to early man who settled in this region of rich aquatic and terrestrial resources including edible grains (Singh 1996). These were soon cultivated for producing rice and other grains in at least seventh-sixth millennia BC, if not earlier, as evidenced at Koldihwa and other sites and confirmed recently at Malhar and Lahuradeva through C^{14} determinations (Tewari et al. 2003). Archaeologists and historians were scared about two decades ago in taking back the antiquity of settlements in this region before the first millennium BC, but the pioneering work at Sohagaura (Chaturvedi 1985) in 1961-62, followed by excavations for seven seasons at Chirand, commencing from 1962-63 (IAR 1962-63:6-8;1968-69:5-6;1969-70:3-4;1970-71:6-7;1971-72:6-7), established the Neolithic-Chalcolithic antiquity of the region. Quite a large number of sites such as Chechar, Kutubpur, Taradih, Senuwar, Narhan, Imlidih Khurd, Dhuriapar, Khairadih, Waina, Bhunadih, Malhar, Agiabir, Jhusi, Raja Nal- Ka-Tila, Dadupur and Lahuradeva (Tewari et al. 2003) have confirmed the earlier findings and have further enriched our knowledge and understanding about the material

culture, dating and chronological sequence of pre-Northern Black Polished Ware cultures of the Middle Ganga Plains.

Remarkable evidence has been recently reported about early farming communities from Lahuradeva, of which the culture sequence has been suggested (Tewari et al. 2003:37-68) as below:

Period I : Early farming Phase (Sub-Period A, Sub-Period B)

Period II : Developed Farming Phase

Period III : Advanced Farming, Early Iron Phase

Period IV : NBPW Phase

Period V : Early Historic (Early Centuries BC/AD)

From Period IA is found handmade and wheel-turned red ware and black-and-red ware, generally ill-fired and having coarse, porous and uneven surface, but with fine slip. Many sherds with cord impressions were found comprising of bowls, knobbed vessels, miniature bowls and vases. Post-holes for huts and burnt clay chunks with reed impressions suggest structural activity of the earliest period. Presence of wild rice (*Oryza rufipogon*) and cultivated rice (*Oryza sativa*) in the matrix of associated pottery in the earliest phase of occupation is significant. The presence of nilgai (*Bosilaphus fragocamelus*), birds, cattle (*Bos indicus*) and buffalo (*Bubalus bubalis*) in the earliest phase is also noteworthy. Two C^{14} dates are 5320 ± 90 (cal. BC 4220, 4196, 4161) and 6290±160 (cal. BC 5298) suggest middle of the seventh to the end of the fifth millennia BC as the span of this sub-period.

In the sub-period IB new shapes of beaker, perforated and legged vessels and spouts were introduced. Sherds with painted linear design over fine dark red slip on the exterior and sherds with post firing incised designs on fine exterior red slip are found from levels of this sub-period. Wheat, barley, lentil and field pea were introduced along with use of earlier grains. A reliable C^{14} date of 3750±90 (Cal. BC 2135, 2079, 2056), places the sub-period around the end of the third millennium BC having a gap of about two thousand years between the earlier sub-period and this sub-period. The thickness of the deposit of Period I is 45 cm.

Period II with a deposit of about 1.60 m witnessed the appearance of black-slipped ware and painted ceramics used along with earlier ceramics showing continuity in tradition. The shapes include dish-on-stand, bowl-on-stand, pedestal bowl, perforated legged vessel, lipped vessel, dise-

Sl.No.	SITE	DATES IN BP	CAL. BC
1.	Koldihwa PRL-101(Charcoal) PRL-100 (Charcoal)	6300 ± 180 7180± 230	5410 – 5010 6375 - 5645
2.	Kunjhun River Face Beta – 6414 Beta – 6415	4010 ± 110 4600 ± 80	2675 – 2515 3530 – 3335
3.	Maffar BS – 1614 (Charcoal)	6380 V 110	5529,5323,5262
4.	Damdama AMS (Charcoal) AMS (Charcoal) PRL-1080 (Charred Bone) PRL-1077 (Charred bone)	3723 ± 50 3984 ± 50 4540 ± 110 4040 ± 110	2149 – 2109 2578 – 2458--
5.	Lahuradeva BS – 1951 (Charcoal) BS-1966 (Charcoal) AMS (Rice grain))	5320 ± 90 6290 ± 160 7532	4220,4196,4161 5298 6309

based bowl, button based lids and spouts and convex sided dishes. Semiprecious stone beads, steatite beads, bone points, awls and arrowheads, stone celt, copper objects etc., were also found.

Period III with about 80 cm thick deposit signifies the introduction of iron and C^{14} date of one of its lower levels is 2940±100 (cal BC 1205, 1205, 1188). Thus Period II can be placed in the first half of the second millennium BC and Period III in the second half of it. Periods IV and V have no direct concern here in the present context. The table(on the previous page) shows (after Tewari et al. 2003:54) C^{14} / AMS dates for the rice bearing deposits of sites in the middle Ganga plain:

Although, evidence of rice-cultivation around 6000 BC was noticed earlier from Koldihwa, the same has been found in the Period I at Lahuradeva in its 60-70 cm thick habitational deposit. This deposit has been divided into two phases ranging between circa 5298 BC and circa 2100 BC as determined from six charcoal samples through C^{14} dates (Tewari et al. 2004a) and has been confirmed on firm grounds from AMS carbon dating.

The archaeological studies, of Lahuradeva have indicated that the inhabitants of Period I used huts made of wattle and daub and used mostly handmade coarse variety of red and black-and-red ware bowls and vessels between circa 7000-8000 and 5000 years BP. Copper was introduced at the site around circa 4000 years BP. The cultural assemblage of this period is largely comparable with the contemporary material of other sites such as Sohagaura, Imlidih, Narhan, Senuwar, Chirand, Koldihwa and Mahagara (Tewari et al. 2004 b). Discovery of wild rice phytoliths, dated around 10,000 years BP, culminating into cultivated rice phytoliths dated since 7000 years BP in the lacustrine sediments (Saxena et al. 2004 : 47-48), attested by fossil diatom assemblage (Prasad et al. 2004:45) in a 2.8 m deep sediment trench profile from Lahuradeva lake (Saraswat et al.2004b:46), has been considered significant.

Epilogue

Although scientific dates help in understanding chronological framework of a site with sufficient number of laboratory samples giving consistent dates, still the tendency of archaeologists in setting aside the dates which are supposed to be inconsistent and out of context at the site, do require thorough investigation. Such dates are either too early or too late, normally the former, suggesting some unnoticed cultural horizon and the latter a recent contamination. In the former case, very rarely there is a possibility of natural cause of the presence of carbon in the sample, but mostly carbon indicates some human activity. To this category, we can place the earliest known

Sl. No.	SITES	UNCORRECTED DATES	CALIBRATED DATES
1.	Kalibangan, Rajasthan	6702 ± 129 (4752 BC)	BC 5566 (5436) 5289
2.	Barkhera, Madhya Pradesh	7460 ± 140 (5510 BC)	
3.	Dadupur, Uttar Pradesh	6330 ± 120 (4380 ± 120 BC)	BC 5284 (5189) 4857
4.	Siswania, Uttar Pradesh	4890 ± 130 (2940 ± 130 BC)	BC 3625 (3588) 3535
5.	Ganwaria, Uttar Pradesh	4740 ± 110 (2790 ± 110 BC)	BC 3508 (3366) 3107
6.	Khairadih, Uttar Pradesh		BC 2853 (2559) 2404
7.	Takiaper (Takiapar), Uttar Pradesh	4730 ± 125 (2780 ± 125 BC)	

date from the Neolithic deposit (?) at Namphuk, district Tirap, Arunachal Pradesh which has been determined by C^{14} method to be 19870 ± 9200 or 17920 BC (IAR 1982-83:141). The earliest date of South Indian Neolithic cultures do not go beyond the middle of the third millennium BC. The early dates from sites of Indus-Baluchistan region or Ganga plains have been fixed and accepted as they show consistence in chronological framework. However, the early dates of seventh-sixth to fourth-third millennia BC at the following sites can not just be ignored, as they not only indicate human activity but also some antecedent proto-Neolithic, Neolithic or Chalcolithic cultural context not clearly identified so far in the lowest levels.

The discussion about the early cultures of the sub-continent cannot be complete without mentioning the role of river Sarasvati and Vedic chronology and the Aryan problem. Without going into any controversial issue, it is now an accepted view by most of the scholars that Sarasvati was a mighty river, the 'foremost of rivers' (*Naditama*), as called in the Rigveda (Acharya 1995) 'whose limitless, unbroken flood, with swift-moving rapid rush, comes onward with tempestuous roar' (Possehl 1999:362). The great magnitude of the river has been attested by the Landsat imageries and other hydrological studies in and along its dried up flood plain. The 'river hymn' (X.75) of Rigveda places Sarasvati between Yamuna and Sutlej (Possehl 1999: 363) and reinforces the argument for the continuity of the name which cannot be searched in any other region as was suggested by some scholars. Kalibangan was located at the confluence of Sarasvati (Ghaggar-Hakra) and Drishadvati (Chautang) and it has been suggested by Herbert Wilhemy (1966: 256-76) after his geomorphological studies that before 2000 BC both the Sutlej and Yamuna drained into the Sarasvati. It has been opined on the basis of palaeo-climatic evidence of lake basin stratigraphy that the period of maximum wetness lasted in the region upto about 1800 BC soon after which the Harappan civilization disappeared and this is connected with drying up of Saraswati (Lal *et al.* 2003:8-9). Thus, the reference of the mighty river in Rigveda must definitely be older than circa 2000 BC. Rigveda and early Vedic literature which mention various classes of people (*jana*) with well defined socio-political system can be roughly correlated to evolution and development of various cultural groups identified archaeologically in the area with continuity in their respective cultural identities covered by Indus-Sarasvati-Ganga system in the time-frame of circa sixth to third millennia BC. The later Vedic phases may correspond to the second millennium BC. Thus associating early Vedic Aryans with the Gandhara Grave Culture or Painted Grey Ware Culture does not seem tenable.

The enigmatic Kot Dijian 'horned deity' appears in both early Harappan context at Gumla, Hathala, Kalibangan, Padri and Babar Kot and in Neolithic context at Burzahom. Recently, during the course of excavations at Bhirrana, the author had a chance to visit the early Harappan site of Kunal where horned deity was noticed on the early Harappan pots, which are typical representations at the site. It probably evolved into the proto-Siva of the Harappan seals. Mehrgarh as well as all the sites of Kashmir Neolithic cultures have copper objects in the Neolithic context whereas microliths, polished stone tools and bone tools are present in the chalcolithic cultures.

The horned human and animal deities such as Chnum, the god of the waters, Sebek, the crocodile-headed god; Isis, the deity with all-bounteous nature; Anubis, the escort of the dead; and Thoth, the Moon-god (Bettany 1890 : 464 – 65) were very common in the early Egyptian culture and have been depicted in art with their label names. The Kot Dijian 'horned deity' was perhaps the earliest of such class of supernatural being and perhaps gave birth to the concept of horned deities which spread towards West Asia as well as to Indus-Sarasvati plain towards east.

The Kot Dijian motif, thus, seems to represent that phase of culture when *asuras* of early Vedic literature were regarded as divine figures in the fourth millennium BC. The motif disappears in the Mature Harappan times and the horned headgear appears with some deities, particularly with that which is referred as proto-Siva, the cultural phase

showing the non-divinity of *asuras* who were continued to be thought as demons or enemy of the gods in the Vedic pantheon. The horned headgear of the *asuras* of West Asia might have also represented Vedic *asuras* like Vritra, Sambara or Namuchi, particularly on the Kot Dijian pots which are meant mainly for storage of grains or water and Vritra has been supposed to be demon of drought and uncongenial weather with whom Indra fought and after overpowering him released the rain. Indra was called *Vritrahan* and *Purandara*, destroyer of fortified cities. Regarding Sambara, it is stated in the non-Vedic religion of the Tantras, that he is a terrifying and erotic manifestation of Shiva in the form of a buffalo. In addition, in the Shakta pantheon, Sambara has a counterpart in Mahishasur 'who is the antagonist/lover–husband of the goddess Durga' and he has a great fish in his flag (*timi-dhvaja*) according to the Ramayana (Parpola 1994: 189).

The 'horned deity' of pre-Harappan cultures including the northern Neolithic and Kot Dijian cultures has remained an enigmatic feature painted on early ceramics with its tradition continuing in the mature Harappan phases, where somewhat similar depictions appear on seals, tablets and also on one terracotta cake from Kalibangan. The horned motif is definitely *Mahisha* or water buffalo (*Bubalus bubalis*), a native species of South Asia, although it is stylized and appears as the headgear of a deity in the Harappan context, often called proto-Shiva. In almost the same timeframe, horned deities appear in Egypt also. Thus, cultural elements found in the earliest habitational deposit of a large number of sites in the entire region of Indus-Sarasvati-Ganga system forming a geological unit or entity, not only put them at par with Chinese or West Asian cultural developments, but also indicate the indigenous evolution and gradual development of cultures together with assimilation and diffusion of various impacts due to intercommunication with far-off contemporary cultures in the long span of almost ten thousand years of growth of civilization of South Asia.

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Harappan Environment as One Variable in the Preponderance of Rhinoceros and Paucity of Horse

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Since the third decade of the last century, several scholars have been advocating a wetter climate during the larger part of the Harappan period. On the other hand, there are other scholars who stress that the environment was not much better than now during those times and that the civilization could thrive only because of judicious management of natural resources. The amount of information on several aspects of the civilization, including the inferences on environment, has been steadily increasing with each passing year. These include indirect clues inferred primarily from objects of utility and art besides direct inferences made on the basis of multiproxy environmental studies. If the global changes in the environment and concurrences in the subcontinent are looked into, one sees a clear pattern, wherein several streams of investigations converge conformably. At the same time, the apparent discrepancies of time spans and discordant data are due to the differences in dating and other techniques used besides other unaccounted variables. It is here that the animals like rhinoceros and horse are useful in the vivid portrayal of the Harappan environment across time. Both the horse and the rhinoceros are known conspicuously in rock art from the humid Mesolithic times and the horse from several Neolithic settings in the country precede the mature Harappan. In this background, the paucity of indigenous horse and the overwhelming presence of rhinoceros in the Harappan civilization appears paradoxical. The puzzle becomes more intriguing when one becomes conscious of the fact that in any habitation normally horses (or the evidence of it) would be most common and that rhinoceros being animals of remote swampy forests would be less common.

Rhinoceros and Horse: Antecedents

Although fossil evidence of extinct species of rhinoceros is known from as early as Late Pliocene (Badam 1979) from the strata of Sivaliks, the earliest known co-habitation of ecosystems by man and rhinoceros is noted in the Middle Palaeolithic context from Soan Valley. Bones of this animal have been reported from Mesolithic sites of Langhnaj and Kanewal in Gujarat and lake sediments in Pratapgarh (UP). At Chirand in Bihar it is obtained in the Neolithic context. The depiction of rhinoceros in rock art is known from the Mesolithic times. The sites include those of Mirzapur region, Roup village, Ghormanger, Harni Harna, Urden, Gelpur, Jaora, Bhimbetka, Ram Chajja in Raisen district (Neumayer 1993) Pachmarhi in Hoshangabad district, Chaturbhujnath Nala in Mandsaur district and Kanyadeh in Chambal valley (Kumar 2001) and Tarsang near Godhra. There are several other sites in

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north India (Mathpal 1984) from where rock paintings of rhinoceros have been reported. During the Harappan times depiction of rhinoceros continued very much but in the form of three-dimensional art.

The indigenous horse, on the other hand, although not known from many sites in contexts earlier than the Harappan, yet is also reported from south India, albeit with a time frame that falls within the Mature Harappan period. The evidence of the earliest domesticated horse comes from Baghor in Siddhi district of Madhya Pradesh, datable to 4500 BC (Badam 1989). Mahagra, another early Neolithic site located in Allahabad district has also produced evidence of domesticated horse. From south India also the Neolithic site Kodekal (2460 ±105 BC) has yielded evidence of true horse (Badam 1989). Significantly, from Chichali, a Chalcolithic site, on the south bank of Narmada, a sherd of the Malwa Period (1800-1100 BC) had depiction of a horse. Obviously, horse was known in (even in peninsular part of) the subcontinent from the Pre-Harappan period. The indigenous horse was very much there in the subcontinent and should not be associated with the controversies of introduction of horse with the 'advent' of Aryans during the decline of Harappan civilization.

Rhinoceros and Horse: Harappan Evidence

The excavations conducted at different Harappan sites have revealed a large number of evidence of rhinoceros both in the form of bones and art, namely, terracotta figures and seals. Frequently, the numbers of rhinoceros from a single site are much more than the accepted or contested evidence regarding horse from all the Harappan sites put together. The terracotta figures are reported from Harappa (Dales & Kenoyer 1993) and Lothal (Rao 1985) besides a rhinoceros mask from Mohenjodaro. More than a dozen seals at Mohenjodaro have this animal, besides one each from Harappa, Kalibangan and Banawali. It has also been reported from small Harappan Sites like Allahdino. Evidence regarding this animal was also obtained from rural sites like Zekda and Kanewal in Gujarat. Bones of rhinoceros have been identified at Harappa, Kalibangan, Lothal, Kuntasi, Surkotada, besides Oriyo Timbo and Khanpur (Thomas *et al.* 1996). Evidently, in the Harappan Civilization, rhinoceros was very much in vogue both in the portrayal and the food economy. In fact, at Harappa, excavations (Dales & Kenoyer 1993) have shown the number of rhinoceros figures (6.3%) to be more than double than that of sheep and goat (2.8%), which shows its popularity as an object for portrayal among the masses.

Evidence regarding horse is noticed from many Harappan sites. Among them, those known from Surkotada, Lothal, Malvan, Ropar, Kalibangan, Harappa, Mohenjodaro, Rana Ghundai (Badam1989) belonging to mature and late Harappan phases, needs no re-enumeration. A terracotta figure of horse from the Harappan levels has been reported from Nausharo. More recently, a terracotta figure of horse has been reported from Rakhigarhi (Nath 1999).

Rhinoceros and Horse: Aspects of Portrayal

In the Harappan Civilization, the rhinoceros is not only depicted in significant numbers but it has been portrayed with qualitative details. The fact that these are depicted on the seals and copper tablets show that these were popular amidst the intellectual classes using them. Perhaps, the most important of such depictions is in the seal with the ithyphallic-seated deity obtained from Mohenjodaro. The finding of the rhinoceros mask from Mohenjodaro shows that the animal had fired the imagination of the artist engaged in the trade of entertainment. Or else it could as well have been a toy for children. Either way, rhinoceros covered a large ground from association with deity, to entertainment and food. The numerous depictions of this animal could not have occurred if the Harappans were not actually seeing the animal, at least occasionally. Scholars in general have been appreciative of the detailed modelling of the animal. At Lothal, the rhinoceros is realistic and reveals a careful study of the anatomical features (Rao 1985).

Although most scholars agree on the evidence of horse in the Harappan levels, there are others who question the "contextual integrity" of the horse remains (Meadow &

Patel 2002). They are of the opinion that the horse came in vogue during the upper levels of the civilization and accept the evidence of horse and two humped camels from Pirak Pd I, dated to 1800-1500 BC. Meadow and Patel (2002) stress, "there are no convincing depictions of either horse or camel in Harappan iconography". There appears to be some lack of fineness in producing the figure of horse. Lal (2005) quotes Mackay "perhaps the most interesting of the model animal is one that I personally take to represent the horse." Lal further writes "Wheeler also confirmed the view of Mackay". Evidently, the artist may have made the horse but could not make it accurately because of an incoherent image in his mind. The same logic could be applied regarding the terracotta image from the mature Harappan levels at Lothal. Although there are several characteristics that resemble the horse, the jaw is much more like that of a dog rather than the longish jaw of a horse. Apparently, the Harappan artist was more familiar with rhinoceros than the occasional horse that was perhaps sparingly used by the merchants.

Rhinoceros and Horse: Aspects of Time and Space

Rhinoceros is conformably known from fossils in geological layers to rock art in Mesolithic, bones and art in Harappans and later times. Due to its popularity, it crossed time and space barriers. Thus Harappan or Harappans influenced seals in far off lands like Shortughai and Tell Asmar depict rhinoceros. This animal's popularity also transcended time, as known from objects found from later cultures, carrying on in fragments of the tradition of the Harappans. Of particular significance is the bronze figure of rhinoceros on a chariot from Daimabad (Dhavalikar 1982). Kuntasi has also yielded evidence of rhinoceros in late Harappan levels (Thomas *et al.* 1996). A terracotta figure of the animal is known from Dangwada from Chalcolithic levels. Chalcolithic paintings depicting rhinoceros have been depicted at Ramchhajja in Raisen district and Deurkothar in Rewa district of Madhya Pradesh. Kumar (2001) has reported a rock painting of rhinoceros at Kanyadeh in the Chambal valley in contextual association of what he calls "post-Harappan" script. Evidently, from the prehistoric to the post-Harappan times the continued popularity of the animal is obvious. Curiously, however, in spite of the strong tradition of portrayal of rhinoceros across different cultures in north India the absence of any evidence whatsoever in relation to OCP and PGW cultures is enigmatic. The rhinoceros again finds favour only during the currency of the NBPW as seen from the examples of Murtaziganj disc and seal from Bhita. The depiction of rhinoceros was now becoming progressively rare baring those associated with depictions of Jaina Tirthankar Sreyamsnatha.

Horse, on the other hand, although known from widespread areas including Harappan and partly later cultures, does not have large numbers as examples. However, from the upper levels of the Harappans, particularly in the late Harappan times, it becomes common. The late Harappan levels at Mohenjodaro, Ropar, Harappa, Surkotda (Badam 1989) and Malvan have revealed the evidence of *Equus caballus* i.e. the true domesticated horse. Meadow and Patel (2002) are of the opinion that the horse is observed from " as early as the end of the Harappan phase and became widespread only by the second millennium." From the later part of the second millennium BC, particularly in the PGW period and later, the evidence of the horse shows an upward trend. This is in stark contrast to the evidence regarding rhinoceros, which showed a downward trend. Although the frequency showing upward trend for horse and general downward trend for rhinoceros since the decline of Harappan Civilization, is a point worth observation; yet this phenomenon is not directly co-relatable and, therefore, not correlated with the changes in the environment alone. In this time span, the situation is more complex, with parameters like: introduction of iron, loss of forests, changes in environment, changes in attitudes of communities, less dependence on hunting, development of trade, development of cavalry and chariots, etc. However, the preponderance of rhinoceros and paucity of horse in the Harappan civilization is herein believed to have been primarily due to the humid Harappan environment.

Environmental Inferences

Besides the empirical inferences of a humid environment obtained by scholars now for nearly seventy years, multiproxy environmental studies have also corroborated the same. Pollen data from Didwana Salt Lake, Rajasthan showed taxa indicative of increased precipitation during the mid-Holocene that started to fall around c.5000 years BP and reached the present levels at c.4200 BP (Singh *et al.* 1990). Significantly, fluvial geomorphological studies done in western India, namely in Godavari, Bhima and Narmada rivers have shown that the most humid phase of Holocene is between 8000 to 4000 yrs BP (Mishra, 2001). According to S. Mishra (2001), after the Last Glacial Maxima, terminating about 14000 years BP, the environment (albeit with minor alterations) is marked by high sea levels, reduced continental glaciers and warm and humid climate. There is a spectrum of researchers who have stressed on higher sea level during the Harappan times. Due to this phenomenon, the Ranns were under a 4 m sheet of water with the Great and Small Ranns forming an arm of the sea. In-situ foraminiferal species observed from the Lothal dockyard have shown the access to sea upto that point of time. This high sea level started receding and achieved the present level at about 4500 years BP. Evidently, a warm and humid climate, including higher sea levels in the coastal areas, led to the bounties of nature, which carried the Harappan civilization in the early part of the mature period. Naturally, therefore, the *terra firma* was not so firm, as it was interspersed with patches of swamps and ponds besides grasslands and forests. It is in this environmental backdrop that rhinoceros was a natural co-habitant close to the Harappan settlements. It is in this context that the horse although known did not find favour until the later part of the Mature Harappan when transition to aridity had already started.

There are many other aspects besides the mere representation of water buffalo, rhinoceros, elephant, tiger, crocodile, fish which definitely stress on the evidence of humid Harappan environment. Perhaps "large number of fish bones" observed in the recent excavations at Harappa goes well with humid climate. The presence of fish bone at Rakhigarhi has been assumed as one of the subsistence traits. Secondly, water buffalo, which contributed significantly to the food economy (Thomas 2002) of the Harappans, requires a favourable environment. These animals were both hunted and kept as domestic animals during the Harappan phase (Meadow & Patel 2002). Water buffalo is well represented in the terracotta figurines obtained from excavations at Harappa (Dales & Kenoyer 1993). Further, depiction of animals of the humid environment is shown in profusion and their remains also identified in significant numbers. On the other hand the typical animals of lesser rainfall areas like the black buck, gazelle and nilgai are not identified at many sites of this civilization (Thomas 2002). Thus, it is clear that the Harappan environment was humid. In fact, scholars have estimated that in the western Rajasthan during the period from 10,000 to 3500 years BP, the precipitation was three times that of the present (Anundson & Pendall 1991).

Discussion and Conclusion

Although there are coherent grounds for assuming a humid environment during the larger part of the mature Harappan period, there have been alternative views also. The grounds cited for the semi-arid type of environment largely rests on such factors like: finding of floral species (including pollens) having affinity to semi-arid environs, use of mud bricks instead of baked bricks that would have consumed large amount of fuel, able management of scarce water. However, to the present author it appears that, like other civilizations, the Harappan Civilization also had the bounties of nature that they could thrive upon. A semi-arid environment is hardly an impetus for the genesis of a civilization that incidentally did not have the advantage of iron technology. In such a backdrop, the development of a civilization would have required an authoritarian regime with an exploitative hierarchical setup. The lack of monumentality and deification of rulers besides variance of material remains between different regions show that the setup was more egalitarian and worked on collective understanding rather than on autocratic fancies. Although here a humid Harappan environment is suggested, there is no denying the fact that there may have been occasional

spells of drought which increased in frequency towards the later part of the mature Harappan period. This may explain the floral evidence of semi-arid conditions in the backdrop of a humid Harappan environment. Moreover, airborne pollens of far off semi-arid areas are more likely to be trapped in the soil where it has some dampness. Similarly, the use of mud bricks in some Harappan sites does not necessarily mean scarcity of fuel but may have been conscious decision of the builders to save effort, time and of course fuel for other purposes.

Scholars have said that the mere presence of rhinoceros in the Harappan Civilization does not make the environmental settings humid as this animal has been cited in western provinces of the Mughal rule. However, there is a vast difference in magnitude if compared with the numerous evidence of the animal in the Harappan period and the occasional sighting of the animal in isolated damp pockets in a generally semi-arid settings. The horse, on the other hand, although known during the Harappan times did not find much favour due to its lack of utility in the given environmental conditions. But with the scientific data on a higher sea level during the Harappan Civilization, it appears that transport by horse was not possible during any part of the year. In conditions of extreme heat and humidity, keeping of the horses required special skills (Meadow and Patel 2002), and, therefore, was not a very favoured option. Thus, the preponderance of rhinoceros and the paucity of horses in the larger part of the mature Harappan period were mainly due to the humid environment. This munificent environment was also largely responsible for the genesis and successful continuity of the Harappan civilization until the onset of increasing aridity. Lastly, in view of the cogent reasons given for a munificent humid Harappan environment for the larger part of the mature period nonetheless substantiated by the quantity and quality of the depictions of rhinoceros, the animal stood as a symbol of Harappan prosperity. To the present author, it appears that, the only way out to negate the humid Harappan environment epitomized so well by the *Rhinoceros unicornis* is to hypothesize about the existence of another species "*Rhinoceros aridensis*", which can be postulated as thriving in semi-arid conditions.

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A Study of Early Harappan Pottery Motifs

ANISHA SAXENA*

The origin of pottery motifs can be traced back to the use of Potter's marks, which were developed by individual potters to label their pottery in order to distinguish it. Eventually these potter's marks must have evolved into motifs and symbols. In the present article, an attempt has been made to describe and classify the pottery motifs found in Early Harappan pottery. Potter's marks found in Early Harappan period were usually incised on wet clay with a sharp instrument or fingernail, then the pottery was fired. Potter's marks are found on pottery from Amri IA-IIB, Kot-Diji, Mehrgarh IV-VII, KGM IV, Jalilpur, Balakot and some other sites in Baluchistan (Asthana 1980, 85).

The Early Harappan cultures are spread over a large area in Northwest South Asia, including borderlands of Iran and Pakistan. These regional Early Harappans have been largely divided into four Phases (Possehl 1982, 2000).

(i)	Amri-Nal Phase:	c. 3200-2700 BC
(ii)	Kot Diji Phase:	c. 3200-2700 BC
(iii)	Damb Sadat Phase:	c. 3200-2700 BC
(iv)	Sothi-Siswal Phase:	c. 3200-2600 BC

Recently, J.M. Kenoyer has suggested another Phase of development of the regional Early Harappans, 'Ravi Phase' (c. 3300-2800 BC), noted at the site of Harappa during his recent excavations. This phase was followed by 'Kot-Diji Phase' (Kenoyer 1997). Ravi ware is closely linked to the Hakra ware, which was identified by Mughal in the Cholistan region, around the dried bed of river Hakra.

Symbols and Motifs

Various types of motifs and designs were painted or drawn on Harappan ceramics of different shapes. Designs were generally painted in rows, which did not reach below the waist of the vessel, sometimes vessels were painted all over; insides of the vessels were also painted. Designs were mainly potter's inventions, taking examples from his surroundings. Some of the motifs have continued till today and can be noticed in contemporary Gujarat pottery, also some symbols or motifs, like the *pipal* leaf motif, have become religious symbols. Thus, we see that the Harappa Civilization provides us with roots of Indian art and culture, which developed and crystallized in the later years.

Designs painted on Early Harappan Pottery can be broadly divided into two categories as (A) Geometric

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Motifs and (B) Floral and Faunal Motifs.

Geometric Designs on Early Harappan Pottery

Geometric designs started with the drawing of a simple line. A simple line became the basis for all the other geometric designs like the cross and variations of cross (e.g. Maltese cross). Later, simple cross gave birth to the swastika pattern, checkerboard pattern, triangles, etc. From a simple wavy line were evolved decorations with loops/ festoons, hoops, spiral patters and fish scale designs. A line could be used horizontally, vertically, diagonally to draw different patterns, crisscrossing, hatching and cross-hatching patterns on the pot. All possible combinations of various forms of line are noticed in the Early Harappan ceramics, like ladder, lattice, square, rectangle and triangle. Use of line to the fullest is seen in ceramics from Amri-Nal pottery from Baluchistan and Kalibangan in India (Manchanda 1977).

Line

The straight-line motifs, like the horizontal bands are basic and universal. A simple line and its variations have been used horizontally, vertically and diagonally. It has also been used to draw different patterns and these forms of lines have been used in various variations depending on the innovative skills of a painter. A line can be thin or thick in nature. Amrians used straight-line motif to decorate all types of pottery, from beakers to jars. Early-Harappans used horizontal and vertical latticed designs to decorate their pottery. Among the Early-Harappans, Kalibanganians used lines lattices, zigzags, grouped crosses or grouped converging lines. This characteristic was absent among the Kot-Dijians.

Wavy lines were also used by Harappans to depict their art. Wavy lines might have their origin in water ripples and might have been used to depict water in most cases. As a potter-painter, it might have been useful to cover large spaces on the surface of a pot using a simple as well as complicated design, such as wavy lines in combination with some other simple motif like a dot or a circle. Wavy lines are noticed among Amrian and Kot-Dijian pottery. Amrians combined these lines with loop-lines, straight lines, triangles. These also have become representational or symbolic motif, representing hills.

Cross

Cross is found on both seals and pottery of Harappan civilization. This motif is both decorative and symbolic in nature. Less representational, it is believed by scholars that a simple cross symbolizes four cardinal directions. A simple cross and its variations are noticed in Early-Harappan pottery from Jalilpur II, Mehrgarh III and IV, Kot-Diji, Kalibangan I and II and Banawali (Fig.1). Two forms of crosses are most noticed, a simple cross and a Maltese cross. Maltese cross is one of the earliest decorative symbols. E.J.H. Mackay opines that this motif appears to have been originated in North Syria, from there it reached Mesopotamia and then through Persia it came to the South Asian civilization of Harappa. Simplest of the Maltese crosses are found in Banawali, where this was achieved by joining four isosceles triangles at their apexes. Sometimes, these triangles in themselves were decorated, filled with colours or with hatched lines or repeated parallel lines (Bisht 1977: 87).

Loops or Festoons

Triangles and angular motifs steadily gave way to loops and curving elements. Sometimes loops were drawn suspended close to each other, thus appearing like festoons. Loops drawn in series one after another also appeared like festoons; sometimes they were drawn over large spaces forming arches. When these loops were used in a continuous line one after another, they appeared like fish-scales, thus scholars generally believed that the loops originated from fish scale design and were representational in nature. Amrians used various variations of loop design — single loop, double loop, loops organized in single line registers. Inside of a loop was often filled with colour patterns of repeated lines. Loop design was used by Kot-Dijians but Kalibanganians used this loop design most efficiently to decorate their pottery(Fig. 2). Spaces between the loops were either painted, hatched or filled with colours. Inside the loops were painted various geometric motifs like a dot or a diamond; in a very interesting example,

spider was painted inside a loop, it appeared as though a spider was climbing a painted wall.

Checker Board pattern

The origin of this motif can be found in a simple cross design, when two or more equal-sized squares are used together and filled with colour in alternate squares. This motif is still used in many Indian decorative patterns and is one of the favourite designs of Indian henna painters. A basic grid pattern design was common among both Harappans and Early-Harappans. This design is first seen in the Quetta valley on the Kile Gul Mohammad ware. It is found on Mehrgarh, Amri, Kot-Diji, Kalibangan, Sothi, Anjira and Jalilpur wares (Fig. 4A & B). Amrians used this pattern to the fullest. Checkerboard pattern was also used in a number of variations. Simple check pattern where solid coloured checks were alternated with empty squares is found on the pottery of Amri I.

Sometimes, squares were not coloured, but were divided by creating small checks, this variation is also found in Amri I. Help of circular motif was also taken; they were drawn inside the squares. Lines, either diagonal or straight were also drawn. Chequer motif was always used to fill large spaces in an efficient manner.

Triangles

Triangles are among the most common motifs or decorative designs used by the ancients to decorate their pots. They were painted as well as incised on the pots. Triangles were usually used in a series, or were used in groups, in lines one after another in ascending or descending order (Fig.5). They could also be representational in nature depicting hills or mountains. They were usually coloured or patterned and were outlined by rows of horizontal lines. Sometimes spaces between two triangles were filled to break the monotony by using various forms of circles, sun motifs or even plant/animal motifs. Triangles were also used opposed to each other, forming a diamond, where in between the bigger spaces were used to depict animals. Best example of this can be seen in Mehrgarh pots, where caprids were painted in diamonds and opposed triangles were painted in bold colours or were hatched. Among Pre-Harappans, triangles are noticed in Amri I, Kalibangan, Mehi, Kulli.

Swastika

Swastika is derived from the Sanskrit words "*asti*" (it is) and "*su*" (well-being). A symbol found in almost all ancient traditions of the world; Susa in Persia, Early Harappa and Harappa in India, Sammarra in Mesopotamia also on ancient Indian and Greek coins. In Hindu tradition, Swastika is a very important symbol; it has always been present in our culture, right from Early-Harappan times. Swastika is an *ashtamangalik* symbol, it is a symbol of good fortune and represents eight directions. It also represents goddesses Lakshmi and lord Ganesha. It symbolizes navagrahas or the nine planets. Swastika, a motif in Early-Harappan period, in all probabilities was derived from a simple cross design and by giving this simple cross its arms. Two forms of swastika are noticed in Harappan and Early -Harappan times, clockwise as well as anti-clockwise. They were not only present on Harappan pottery but were also incised on Harappan seals. Swastika graffiti is also seen on the Megalith pottery, found at Kunhnatur, Coorg and Coimbatore (Thapar 1964).

Flora and Fauna

Various forms of Leaves

Various forms of leaves were painted on Early-Harappan pottery. Some leaves have been identified as palm leaves, some as banana leaves or neem leaves, but it is the *pipal* and banyan tree leaves that are most commonly noticed on Early-Harappan and Harappan pottery. Depiction of *pipal* leaf could have been symbolic in nature; however, it is not clear whether the *pipal* tree held the same importance in the lives of Harappans and Early Harappans as it does in contemporary India. But worship of trees was a regular phenomenon of ancient cultures and civilization. In case of the *pipal* tree worship and drawing of the *pipal* tree leaf onto the pottery, we notice a continuation of culture. This motif has become a very important symbol in the contemporary cultures of India.

Among various shaped leaf designs noticed on Pre-

Harappan pottery, the so-called palm leaf shape is noticed in various forms, single or collectively growing from a stem. Another type of leaf is a broad leaf, which covers wide areas, unlike the leaf described above, these leaves are continuously drawn on both sides of a large strong stem and are painted or hatched or just straight lines are drawn on the inside. Sometimes, these leaves have curving ends, at other times, circular. This motif is seen on pottery from Mehi, Kalibangan and Amri. *Pipal* leaf motif first appears at Rehman Dheri I (3600 BC.). *Pipal* tree motif has been widely noticed among the Early-Harappan pottery in Nal; Ropar I; Mehi; Mehrgarh IV, V, VI; Amri I, II; Kalibangan I, II; Kot-Diji II and Faiz Mohammad Grey Ware (Fig. 6). Sometimes, pipal leaf is painted in solid colour, at other times, it is hatched or horizontal lines are drawn, but the most interesting is the motif, where the *pipal* tree is associated with horns, bulls and other sacred objects. At Amri, *pipal* leaf is shown associated with birds. *Pipal* tree leaf was often painted in group of three, which might have an important meaning or function. A fig tree like banyan and *pipal* have a long tradition of being sacred not only in case of India, but this is true in many cultures of the world.

Neem leaf design is also seen painted on pottery of Early Harappans; this may have been because they were aware of the medicinal value of *neem* tree and its leaf and the same may have been sacred in nature like, the *pipal* tree.

Flower design

Rosette or four-petalled flower motif is noticed in Early Harappan pottery. Begimings of the rosette design can be traced back to the Tell Halaf period in Mesopotamia. Among Early-Harappan cultures, Nal shows use of this design but in very limited quantity. Mehrgarh IV, Amri, Kot-Diji I, Kalibangan I, show traces of use of rosette design. The earliest four petalled rosette designs are noticed on Kalibangan potsherds. At Amri ID, a simple rosette with three wavy lines is observed. At Kalibangan I, the same motif with three wavy lines along with another additional decorative element (a small circle placed on each end of the petal with colour filled in them) is noticed. An example of plain rosette motif also comes from Kalibangan, hatched examples of the rosette motif are also noticed. Three types of rosette design became most popular. First is the four-petalled flower, which was widely used by Amrians and Kalibanganians to decorate their pottery. Second is the intersecting circle design, which is noticed on Kot Dijian and Amri pottery; its best example comes from an engraved floor tiled from Kalibangan. This motif was later used in Mature Harappan period to decorate large pots, where this design was painted all over ceramics; the best example of this is a large jar from Mohenjo-daro. The Third pattern is a multi-petalled rosette design, which is also noticed among Early Harappans; the first of such kind is noticed on Kot-Diji Pottery, on the famous '*Proto-Siva*' jar, right next to the horns of the headdress. Multi-petalled rosette is also noticed at Kalibangan, but reached its height during Mature Harappan period. Repeated rosette motif is noticed on pottery sherds from Kot-Diji, Amri. Sometimes the motif is repeated horizontally, at other times in lines one after another. Various forms of rosette design are noticed among Early Harappans, starting from the plain rosette design, the design became common and was amalgamated with several of the other designs and motifs like circle, square, hatching and cross-hatching was used to highlight the motif itself.

Other Flower designs

In Mehrgarh IV, a very unusual motif was seen, it looked more like a solar disc than a flower; a similar motif is seen at Tepe Gawra. A flower motif is noticed on a pottery shred from Kot-Diji II (a six petalled flower, surrounding a circle); at Amri II also, a nine petalled flower is noticed again surrounding a circle.

Fish

Fish has always been a very important symbol in South Asian cultures; it is one of the most common motifs depicted on Early and Mature Harappan pottery. A large variety of fish was consumed by the Harappans and the whole activity of catching fish with the use of nets was also depicted. Fish imagery is very much a part of the Indus Age. The first appearance of fish on pottery comes from Period VII of Mehrgarh, it depicts fish swimming in water among water plants. Then fish was noticed in Kulli, Amri-Nal

and Kalibangan ceramics.

Fish motif was among few decorative motifs, which later transformed themselves into important signs of the Harappan Script. A. Parpola (1997) has interpreted fish motif in terms of Harappan Script, he feels that fish sign also must have been derived from the early potter's marks, but necessarily did not suggest 'script' during Early Harappa. Its development as script must have happened later. He suggests that fish as a symbol could denote star or eye, and fish swimming in water could represent for night sky.

Snake

Snakes are usually not noticed on Early Harappan pottery, snakes appear on Mature Harappan pottery from Lothal, but interestingly in Mehrgarh Period IV, which is Early-Harappan in nature, dated to 3600-3200BC, we notice snakes been painted on interior of the jars, the actual reason for this is unknown. Snakes were depicted on vessels from different sites from Iran and Baluchistan, but this was done on the outer surface of the vessel. Except this, snakes are till now not noticed on any pottery or potsherds from Early Harappan period.

Animals and Birds

Various kinds of animals and birds were depicted on Early Harappan pottery, the earliest animal representation comes from Mehrgarh Period III, where birds and caprids were painted on pots in series of rows. It almost became an Early Harappan style of depicting animals and birds in registers or rows, where the registers on the top and the bottom were painted with geometric motifs. In Mehrgarh ibexes were painted in rows, these animals were painted in stylized manner with their horns painted in a peculiar type (long and wavy), similar type of animal representation was also noticed in Kulli and Mehi. In Togau, a sequence was noticed, where over three phases the stylization of caprids, animals were usually painted in black paint. In Period III of Mehrgarh, ibexes were painted inside diamonds (opposed triangles), sometimes the area around was painted in bold colours or hatched pattern. Mehrgarh Period IV showed a great improvement in animal depiction, in one of the pottery sherds, a group of birds are seen sitting on a horned bull, a very realistic depiction of their natural surroundings (Fig.7A & B). In Period II at Mehrgarh, birds also appear on pots represented realistically, however, painted in rows. In Period IV, we notice depiction of a large bird, which looks like a peacock, the body of the bird has been depicted with the use of various forms of lines, this may have been done to represent feathers of the peacock, peacock was one of the favourite animals of Harappans and was often depicted on pottery, especially in Mature Harappan period. Peacocks are also noticed on pottery from Kalibangan. At Nal, where animal and plant motifs rarely appear, a very interesting example of a painted animal head is noticed. On a cup painted in Polychrome, a unicorn/ibex head is seen coming out of triangular motif, which may represent bushes, this is a very realistic depiction of an animal in their natural surroundings.

Both sigma and chevron patterns have long been said to have signified flying birds. At Amri, we notice use of sigma design as fillers in the borders. Marshall has suggested that in Nal pottery also, stylized birds were depicted, but we need more evidence to prove this.

Horn

The horn is a symbol of power and strength; this perhaps became an important symbol because of the strength of bull and importance of this animal in ancient cultures. Both bull and horn have become important symbols associated with religion in India. It is believed that first appearance of horn motif is seen in Kot Diji, but this has become a controversial issue. Sankalia feels that this motif is different from the horn motif, which appears in Mature Harappan period. He further says that this design is partly Harappan and partly Iranian in nature. It is very difficult to say that this motif in Kot Dijian phase was symbolic in nature and this particular jar was used as a ritualistic jar, but it cannot be denied that the jar depicts a horn motif. Horns are also depicted in Kalibangan pottery, there is no doubt that horns became very important symbols in this phase because of the baked clay tablet found from Kalibangan, which depicted a horned deity. In Kalibangan

pottery motifs, horns were also associated with *pipal* tree leaf and seeds, thus we notice an amalgamation of three very important symbols.

Summing Up

A detailed study of symbols become very important in context of Indian art and history, as certain symbols have their origin in Chalcolithic period and continue till today as important religious and social symbols in contemporary Indian society and religion. A detailed analysis of the phenomenon of birth and development of symbols in Indian art is much needed.

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Simple Cross



Maltese Cross



Mehergarh IV



Kot Diji



Banawali

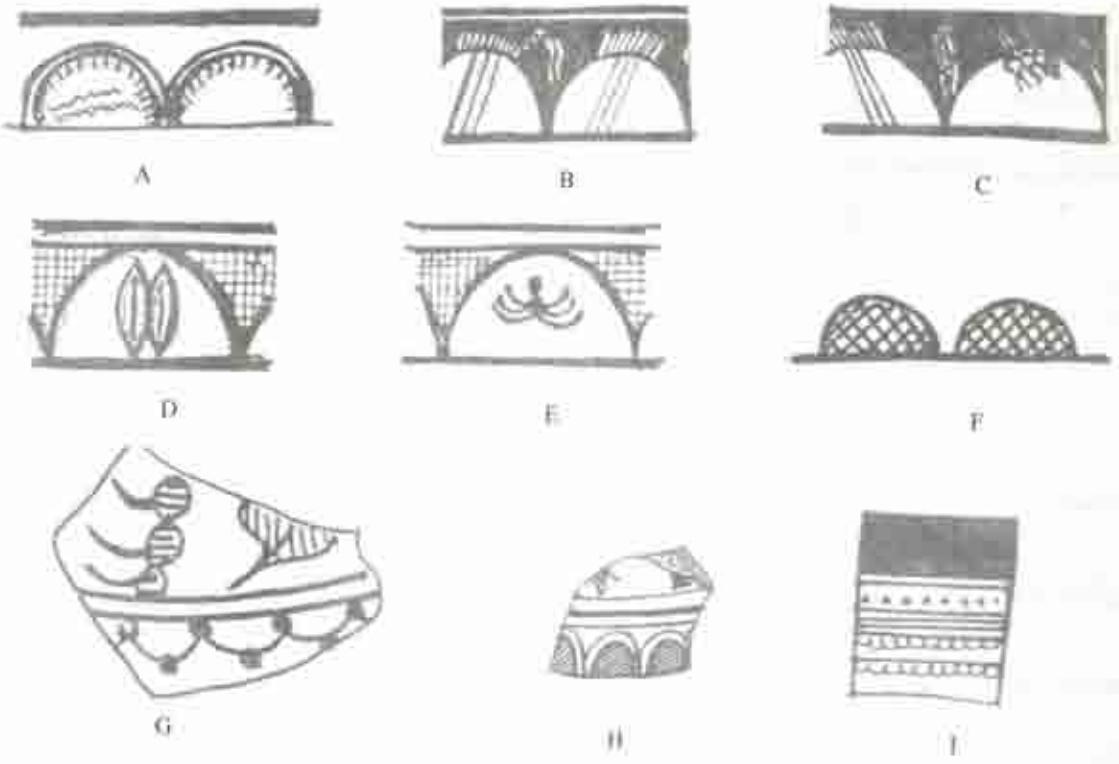


Kalibangan



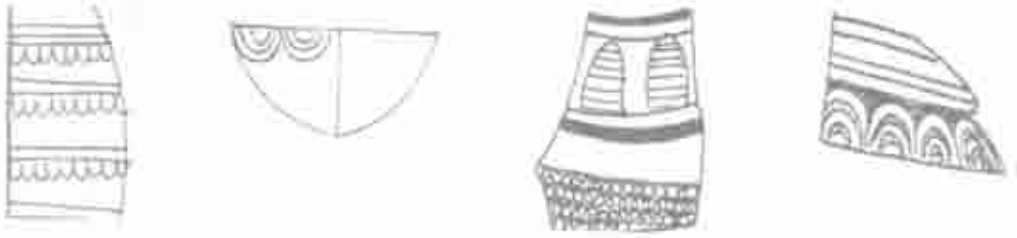
Harappa

Fig. 1 : Cross motifs on Early Harappan pottery



Figures A, B, C, D, E and F show loops used as arches. Figures G,H, I show use of multiple arches. Hatched pattern is mainly employed to decorate the outer and inner spaces.

Various types of loop design from Kalibangan



Various forms of loops used by Amris. Examples of double loop, single loop with horizontal lines and multiple loops can be noticed.

Various types of loop design from Amri



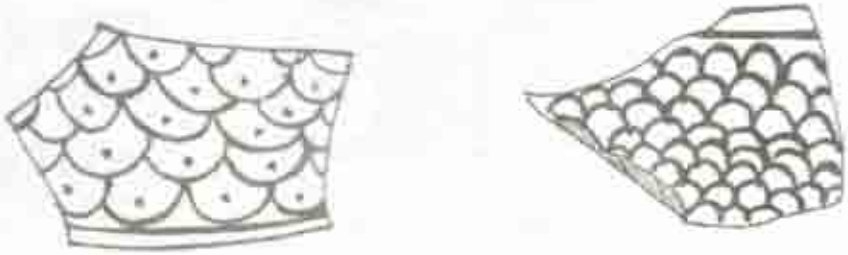
Fig. 2 : Loop design noticed in Kot Dijian pottery sherds



Amri I



Kot Diji



Pottery sherds from Kalibangan, showing fish scale motif



Pottery sherds from Harappa

Fig. 3 : Fish Scale Motifs

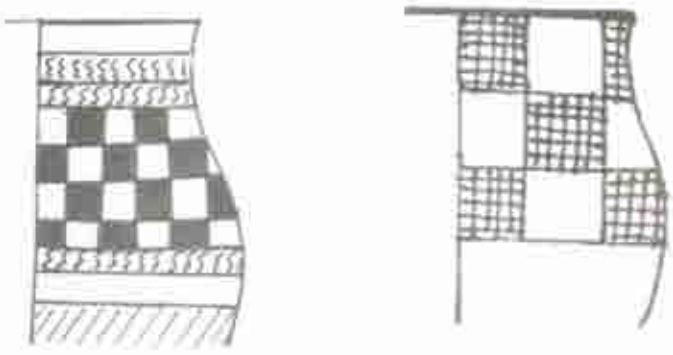


Fig. 4A : Check board pattern noticed on two pots from Amri I



Fig. 4B: Checks employed as a decorative pattern on Nal pottery



Amri I Kalibangan Kalibangan

Fig. 5 : Triangles on pottery from Amri I and Kalibangan

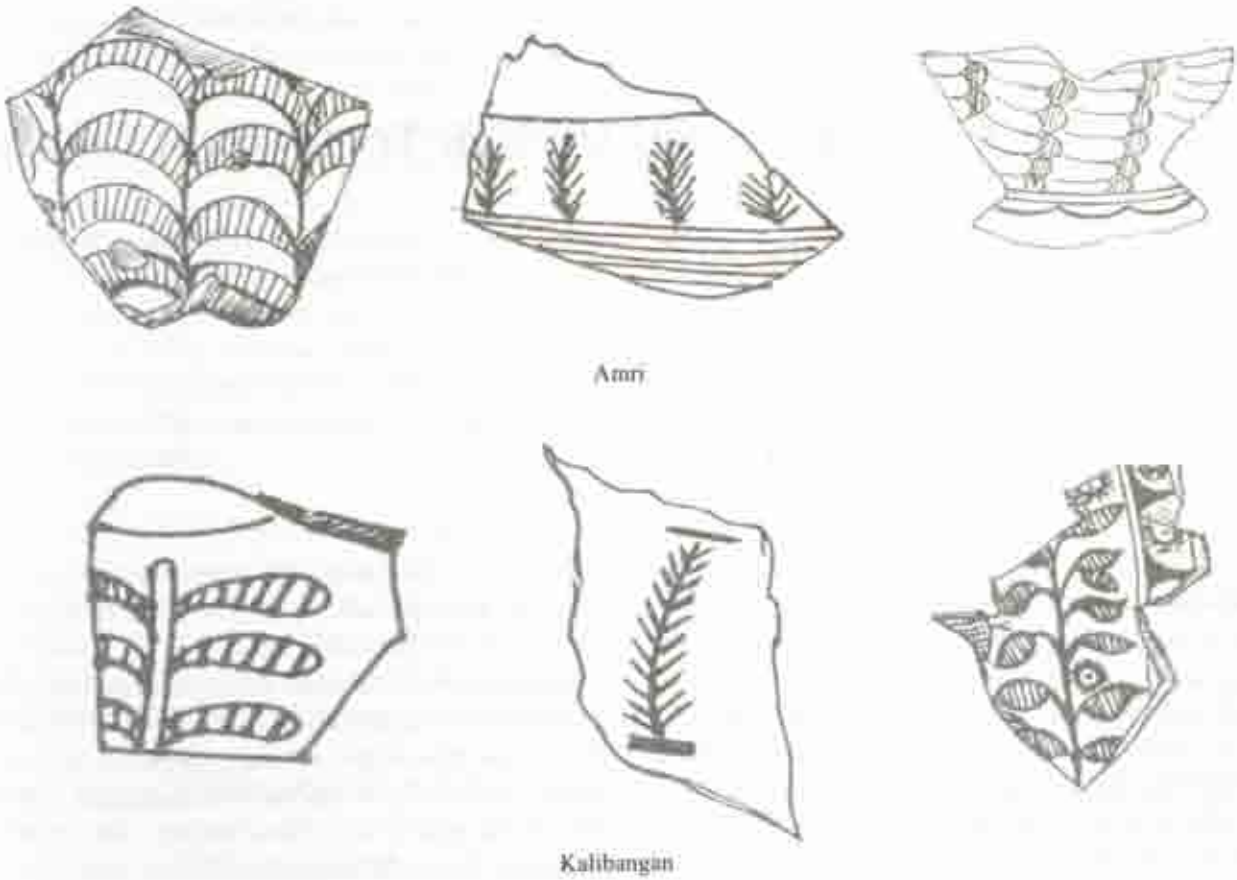


Fig. 6 : Various kinds of leaves on Pottery Sherds from Amri and Kalibangan



Fig. 7A : Pottery sherd from Mehrgarh Period IV, depicting birds, bull and sun motif



Fig. 7B : Pottery shard from Mehrgarh Period IV, depicting birds

Early Chalcolithic Ceramic Traditions of Gujarat

PREETI PANJWANI*

In Gujarat, the antiquity of pottery making tradition cannot be ascertained accurately. This is because of the fact that no direct evidence of the Neolithic period is found in Gujarat. However, the earliest evidence of pottery-making dates back to as early as the middle of the 4th millennium BC from the Pre-Harappan times. The Pre-Harappan phases in Nagwada and Loteshwar in the so-called Anarta region as well as at Padri and Prabhas Patan have produced evidence of early ceramic tradition in Gujarat.

Gujarat (20°1'-24°7' N and 68°4'-74°4' E) covers an area of about 179,320 km^2. This region consists of major peninsulas, gulfs, islands, ranns, creeks, marshes, hills, plateaus and coastal strip.

Physiographically, Gujarat constitutes three distinct zones.

1. Kutch. 2. The Saurashtra peninsula or Kathiawar. 3. Mainland Gujarat (Mainland Gujarat is further subdivided into northern and southern segments).

Protohistoric Pottery in Gujarat

Gujarat is rich in Chalcolithic sites and very little effort has been made to understand the genesis and structural set up of the Harappan and allied society. A cursory glance through all the published reports on Pre/Mature/Late Haruppan pottery on the basis of form/fabric/decoration has enabled reconstruction of changes that took place in all the three stages. Until recently, it was assumed that the earliest settled communities in Gujarat were associated with the Mature Harappan phase (2500-2000 BC). Almost all the important excavated Harappan sites like Nagwada and Loteshwar in north Gujarat, Padri in Saurashtra, Dholavira and Surkotda in Kutch and also the re-analysis of the older archaeological data from Prabhas Patan and Lothal have suggested that prior to the coming of the Harappans in Gujarat, it was already inhabited by the Regional/ Indigenous/ Non-Harappan Chalcolithic communities. These sites have yielded distinct regional pottery; along with the typical Harappan pottery, antiquities and cultural relics. These non-Harappan cultural relics found in an otherwise Harappan context varied both in quantity and quality. However, separate stratum of this community is yet to be located in Gujarat. Rather, none of the excavations has stratigraphically yielded a separate horizon of Pre/Early Harappan complex in Gujarat.

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A new data is coming up now from the recent discoveries and also from the re-analysis of already reported sites for understanding the Pre/Early/Non-Harappan cultures of Gujarat which can also be termed as indigenous traditions of Gujarat. They are distinct from the Harappans in their material culture and they have an independent chronological/stratigraphical existence, prior to the beginning of the Harappan occupation in the region under study. Although no serious attempt has so far been made to evaluate the significance of this non-Harappan component in the making of the Harappan Society, excavations and explorations of the number of sites in different parts of state have yielded a distinct variety of pottery from this Pre/Early/Non-Harappan culture.

Padri: Padri is an ancient site in Talaja Taluka of Bhavnagar District, Gujarat. Excavations have revealed a two-fold cultural sequence: Early Historic and Harappan. On the basis of ceramic assemblage, the Harappan phase, dated 2200-2000 BC, appears to be rural in character like that of Rojdi and Kuntasi (Shinde 1992). The ceramic assemblage is of two broad categories: Fine and Coarse. Coarse variety is again of two types Red/Grey Ware and 'Padri Ware,' which is made of very coarse clay. This ware is the first of its kind and seems to be different in terms of raw material, technique of manufacture and limited shapes (Shinde 1991-92). Due to disturbances in the layers, these sherds have been found from Harappan as well as Historic levels. These distinct pottery types belong to the Non-Harappan tradition in terms of their manufacturing techniques, raw material and shapes.

Nagwada: Nagwada is located at about 3 km south of Nagwada village in Dasada Taluka of Surendra Nagar district of Gujarat. Excavation of Nagwada (Hegde *et al.* 1986-87) conducted by M.S. University of Baroda has brought to light many aspects of the life and culture of a small village community affiliated to the Mature phase of the Harappan civilization.

Evidence of Pre-Harappan peasant settlements in Gujarat (Hedge 1989) was revealed for the first time at Nagwada. Though it has not yielded a clear habitation deposit, it appears to have been disturbed by the Mature Harappan community who came to live at the site. The predominance of the Non-Harappan together with the characteristic Harappan pottery makes the site little different from other excavated Harappan sites of Gujarat. In fact, these so-called sites of Pre-Harappan phase with regional Chalcolithic tradition, involving Non-Harappan pottery, are all Indigenous/Regional and not Pre-Harappan.

One of the important contributions from Nagwada excavations was the discovery of burials sealed by the fifth layer representing the earliest phase. Here, the pot burials, like the pot burials from Surkotda (Joshi 1970), show affinity to the Pre-Harappan of Amri and Kot-Dijian tradition, while the urn burials reflect regional shapes and decorations. These shapes are found for the first time in Gujarat and are of great importance for understanding the movement of the people. The pottery assemblage and other artifacts show close similarity with the Surkotda IB & IC periods, Desalpur, Lothal and Rangpur IIA (Bhan 1989).

The occurrence of Pre-Harappan and also Non-Harappan forms like Coarse Gritty Red ware and the White-painted Black-and-Red Ware suggests that the community that migrated into the north-western part of Gujarat did not come from Sindh directly, nor from Saurashtra, but they assimilated different cultural equipments during their movement over a long period of time. Thus, the pottery recovered from Nagwada excavations show a marked difference in their production, finish and decorations compared to the typical Harappan pottery. These Non-Harappan wares, especially the Coarse Gritty Red Ware found at Nagwada, is in fact similar to the Coarse Red Ware found at Lothal, and this could be due to the addition of more quantity of grit and imperfect firing. The use of carbonaceous matter and imperfect firing were responsible for the production of this kind of ware (Fig. 1 & 2).

Surkotda: Surkotda is located 12 km north-east of Adesar, District Kutch in Gujarat. Based on ceramic evidences, the entire habitational deposit is divided into three periods: IA, IB and IC. The common factor is the Harappan Red Ware, which decreases in percentage in the later periods. Remarkable feature here is that in all the periods, some other

ceramic traditions like Polychrome/Polytone occur, suggesting that different ethnic or cultural groups were living with the Harappans in harmonious conditions.

Lothal: Lothal, in Ahmedabad district of Gujarat, shows the exuberance of Micaceous Red ware and Black-and-Red ware. It suggests that the folks adopting this ware were indigenous as both the wares show precedence over the Harappan wares in the lower levels. However, no serious consideration was given to this stratum, as there was no independent or separate layer prior to the Harappans. The indigenous forms and decorations were later copied in the Harappan ware within a very short span of time.

Loteshwar: Loteshwar, a small village, is situated about 12 km north of Sankeshwar in Sami Taluka of Mehsana district of Gujarat. The site revealed a habitational deposit of two cultural periods. Period I marked quite an early beginning of microlithe tradition representing large number of microliths. The ceramic assemblage of Period-II shows similarity with the Non-Harappan (Regional) pottery types similar to that reported from Nagwada and Surkotda. It represents a different kind of pottery, which is distinct from the Mature Harappan Pottery. This Regional pottery had a very early origin dating back to 3500 BC, which suggests their existence prior to the Harappans. The Regional pottery is found not mixed with any other cultural traits of the Harappans.

Prabhas-Patan: Prabhas Patan, located on the bank of Hiranya River in Junagadh District on the southern coast of Saurashtra, Gujarat, revealed the earliest Non-Harappan assemblage. Excavations have brought to light a five-fold cultural sequence. Period I and II are designated as Pre-Prabhas and Prabhas respectively. These are important as these incorporate distinct ceramic assemblages, different from the Harappans. Period III on the other hand is characterized by the presence of Lustrous Red Ware and therefore it belongs to Late-Harappan phase of Gujarat.

Period-I revealed few pottery types like Coarse Red/Grey Ware, Red Slipped Ware, Black-and-Red Ware and Incised Red Ware. Fabric of these pottery types is predominantly coarse and hand made. It is almost same for what Rao has called Coarse Red/Grey Ware at Lothal. There are two C^{14} dates: 2983 ± 65 BC and 2869 ± 80 BC, (three to four centuries earlier than Harappans in Gujarat). This type of assemblage is not found elsewhere in Saurashtra. Period II is marked by the new set of ceramic assemblage known as 'Prabhas Ware' dateable to 2000 B.C.

Datrana: Datrana is located about 2 km south-west of the village in Banaskantha district of Gujarat. Excavations by the M.S. University of Baroda have revealed a two-fold cultural sequence: Period-I and Period-II. Microliths and other Mesolithic relics represent Period-I, whereas Chalcolithic relics including pottery and copper implements represent Period-II. No stratigraphic break between the two is noticeable (Ajith Prasad). Period-II is characterized by distinct types of pottery belonging to different Non-Harappan traditions comparable to Pre-Prabhas and Nagwada etc.

Dholavira: Dholavira is in Bachau Taluka of District Kutch, Gujarat. Excavations revealed a well-established occupation beneath the Mature Harappan phase (Bisht 1991), but in the absence of radiocarbon dates and a clear description of the pottery, not many inferences can be drawn about the exact nature of the Pre/Early Harappan phase.

A glance at the radiocarbon dates for the Harappan and other Chalcolithic sites in Gujarat may indicate that the majority of dates for Urban Harappan fall within 2500-2000 BC. But sites like Prabhas-Patan, Padri and Loteshwar show dates earlier than 2500 BC. Calibrated Radiocarbon dates for the cultural phases from Padri, Loteshwar, and Prabhas Patan go back to the second half of the fourth and the beginning of the third Millennium BC, making them half a millennium earlier than the Harappan immigrants. Dholavira, Nagwada, and to some extent Lothal, show stratigraphic precedence over the Harappan assemblage (Table-1).

Ceramic Fabric

Fabric is based on the type of clay used for a particular

purpose. In Gujarat, we do come across a variety of fabrics. The purity of the clay plays an important role in the fabric. Sometimes, coarse fabric is intentionally produced, which helps to cool water due to evaporation and withstand thermal shock in case of cooking vessels. Thus, coarse or fine fabric of the vessel depends on the functionality and shape. Here mention may be made of the 'Regional Pottery' of Nagwada and the 'Padri Ware' of Padri, which is perhaps the same as the Coarse Red Ware reported from Lothal, which is comparatively more gritty in fabric because of more amount of grit and imperfect firing.

Functional aspect of the pottery

So far as the origin of Harappan culture in Gujarat is concerned, it has its roots in the Harappan civilization of Sindh. Once arrived in Gujarat, the Harappan culture developed a certain typical characteristic. Some of the typical Harappan pottery types were in use along with the newly evolved shapes of early pottery tradition.

Several types of cultural assemblages occur in Gujarat, which are later than the Mature Harappan phase, but culturally do not exactly conform to the former or rather they have incorporated local traits (Bhan). Until recently, the periodization of Rangpur was considered as the parameter to define the site periodisation of Harappan Gujarat. However, now the earlier interpretation has changed. It appears that all the Rangpur II category sites will fall in the time bracket of Mature Harappan period, which were previously thought to represent Late Harappan period.

The Late Harappan pottery is not much different from the Mature Harappan as far as the shapes are concerned, but the poor treatment of the surface differentiates the former from the later. Almost all the types and shapes continued to be in use in the Late Harappan levels with little alterations and variations. So, there can be hardly any gap between the Mature and the Late Harappan culture. Technique of potting, backing etc. was same in the Mature and Late Harappan phases. But later, lots of changes are witnessed in the pottery-making of the Post Harappan culture in Gujarat.

The most important ware of this period, which is distinct from the Mature Harappan, is the Lustrous Red Ware. However, this new ware got evolved during the Post Harappan phase. Though most of the shapes of Lustrous Red Ware evolved from the earlier periods, it is totally a new type of pottery fabric tradition. It is mainly reported from period III of Rangpur, Prabhas Patan III and may be Rojdi C. A close study of the various forms clearly show that the Lustrous Red Ware culture was not an intrusion from elsewhere, but a local development of the Harappan culture with some alteration. Thus, the Harappan Civilization in Gujarat begins with the Mature Harappan culture and ends with the appearance of Lustrous Red Ware representing Post Harappan culture.

All the pottery types found in Gujarat, like bowls with straight or convex profile, featureless and excurved rim, stud-handle bowls, occasional bowls with squattish stand or high ring based bowls, storage jars with ridged shoulder and slightly averted rims, perforated jars and jars with 'S' profile, show much similarity with the Harappan pottery types with some local variations.

The size of the pottery forms is also according to the nature of its use. The storage jars are basically used for storing and therefore they are strong, having bulbous body. The daily use vessels; like beakers, goblets, bowls etc.; are small and handy vessels having featureless rims. Vessels used for pouring liquids had beaded rims so that the liquid did not spill out. The shape like 'Dish-on-Stand,' which occurs in Pre-Harappan levels, continues in the Harappan and even subsequent periods. The Dish-on-Stand still prevails in Gujarat (Hashim 1977). The carinated dish of Mature Harappan pottery is not encountered at late Harappan levels.

Conclusion

Till now, more than five hundred sites showing Harappan affiliation are discovered and has substantially increased our understanding about the Harappan and the Indigenous/Regional Chalcolithic cultures (Fig.3). The Pre-Harappan Chalcolithic settlements in Gujarat were never

taken into serious consideration, because they were not found from any independent context. Regions of Kutch, North Gujarat and Saurashtra have now revealed sites showing existence of Indigenous/Regional Chalcolithic traditions(Table-II). They are distinct in their material culture, having an independent existence, chronologically as well as stratigraphically, prior to the beginning of Harappan occupation in the region. Gritty Red ware is the most abundant among the regional traditional pottery.

Pottery assemblages from all the Pre- and Post-Harappan sites of Gujarat are different from Harappans in their material culture. Excavations at Nagwada brought to light early Harappan assemblages from stratigraphic context, which has already been assigned to Pre-Harappan occupation. Was the pottery from the burials at Nagwada the first indication of an Early Harappan occupation in Gujarat? Who were all these Early Harappan people? In fact, in Nagwada, more than 80% of the total pottery assemblage is regional pottery.

At Surkotda, Non-Harappan assemblage is present in the earliest levels along with Harappan assemblage. At Prabhas Patan, two periods, Pre-Prabhas and Prabhas incorporate distinct assemblage, which is different from the Harappan. Similar evidence has been reported from Datrana. At Loteshwar and Datrana, regional pottery is found not mixed with any other cultural traits of the Harappan. In fact, nothing conclusive can be said, as it is only regional rather than indigenous tradition. However, very little is known about their cultural interaction and the origin of these early village-farming communities of Gujarat.

S.R. Rao, while reporting Lothal, for the first time attributed the term Indigenous folk to the people who were using Micaceous Red Ware and Black-and-Red Ware at the lowest layer though it was not a separate strata. Anyway, no distinct habitation deposits are reported from these sites. A glance at the radiocarbon dates may indicate that majority of the dates fall within 2500 BC–2000 BC time bracket, but sites like Prabhas Patan, Loteshwar and Padri show dates earlier than 2500 BC. These Regional Chalcolithic sites in Gujarat indicate time bracket of 3500-2600 BC.

The Early Chalcolithic phase of Dholavira and Surkotda in Kutch, burial phase at Nagwada, and to some extent Micaceous Red Ware phase at Lothal show stratigraphic precedence over the Harappan assemblages. They have an independent chronological/stratigraphical existence. In fact, it is the interaction which has given rise to distinct cultural patterns observed in the Harappans of Gujarat.

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Table 1: Radio Carbon Dates from Harappan-affiliated Chalcolithic sites of Gujarat.

Site & Sample No.	Cultural Affiliation	Date BC/BP	Calibrated Date Half Life 5730
Lothal	Urban Harappan		
TF 136	Lothal A, Period 1A	2080 ± 135 BC	2461 Cal. BC
TF 22	Lothal A, Period IIIB	2010 ± 115 BC	2328 Cal. BC
TF 27	Lothal A, Period IIIB	2005 ± 115 BC	2315 Cal. BC
Surkotda	Urban Harappan		
TF 1305	Period 1A, early Levels	2055 ± 100 BC	2455 Cal. BC
TF 1301	Period 1A	2005 ± 135 BC	2315 Cal. BC
TF 1295	Period 1B	1945 ± 100 BC	2202 Cal. BC
Rojdi	Urban Harappan		
PRL 1284	Rojdi A	2325 ± 115 BC	2699 Cal. BC
PRL 1093	Rojdi A	2098 ± 115 BC	2462 Cal. BC
TF 200	Rojdi B	1975 ± 115 BC	2283 Cal. BC
PRL 1088	Rojdi B	1935 ± 115 BC	2198 Cal. BC
Nagwada	Urban Harappan		
A 4555	Period 1B	1860 ± 80 BC	2133 Cal. BC
Prabhas Patan	Pre-Harappan		
PRL 90	Period I, Pre-Prabhas	2415 ± 115 BC	2892 Cal. BC
TF 1287	Period I, Pre-Prabhas	2460 ± 110 BC	2911 Cal. BC
	Urban Harappan		
PRL 92	Period II, Prabhas	1195 ± 100 BC	2299 Cal. BC
TF 1282	Period II, Prabhas	1755 ± 95 BC	1953 Cal. BC

Loteshwar	Pre-Harappan		
PRL-1564	Period II, Anarta	2510 ± 110 BC	2921 Cal. BC
PRL-1565	Period II, Anarta	3100 ± 110 BC	3698 Cal. BC
Padri	Pre-Harappan		
PRL-1785	Period II	4520 ± 90 BP	3049 Cal. BC
PRL-1787	Period II	4960 ± 100 BP	3680 Cal. BC

Table II: Cultural sequence of some of the Chalcolithic sites of Gujarat.

	Lothal	Surkotda	Somnath	Padri	Loteshwar	Datrana	Nagwada
500 A.D.			Period V Early Historic				
01A.D			Period IV, Early Historic	Period I Early History			
500 B.C							
1000 B.C							
1500 B.C		Period IC, very Coarse Red ware.	Period III, Post Urban: Lustrous Red ware, Black and Red ware				
	Lothal B: Phase V Post Urban 1500 B.C.	Period IB, Coarse Red ware, rarely decorated with Black strokes					
2000 B.C	Lothal A: II, III, IV Urban Harappan Inscribed seals+ Harappan Wares + Micaceous Red ware + Black and Red ware	Period IA, Harappan Red ware, Polychrome Cream Slipped ware, Polychrome slipped ware,Reserve slipped ware, greyware, coarse red ware	Period II, Prabhas ware. Black and Red ware, Harappan wares, faience, Steatite, Beads, Structures				Period IA Anarta, Harappan pottery Inscribed Sealing Copper + Shell + Stone Beads
2500 B.C.	Lothal A: Phase: I, Harappan? +M R W + Black & Red ware.						

	Lothal	Surkotda	Somnath	Padri	Loteshwar	Datrana	Nagwada
2500 B.C.	Lothal A: Phase, I, Harappan? +M R W + Black & Red ware.			Period II Sorath Harappan + Padri ware			
3000 B.C.			Period I, Pre-Prabhas, Faience, Steatite, Incised Red and Corrugated Red wares Crested ridge blade			Period IIPre-Harappan, Anarta+Burial pottery + Black and Red ware, Incised Red/Grey and Corrugated wares + copper + beads + Rohri chert blades	Period IB Burials Pre-Harappan Pottery
3500 B.C				Padri ware + Harappan? + copper + Lithic/blade tools	Period II,Course Gritty Red ware, Fine Red ware (Regional), Course Red ware, Burnished Black/Grey ware-Blacked Red ware		
4000 B.C.						Period I Mesolithic Period	
4500 B.C.					Period I Mesolithic Period		

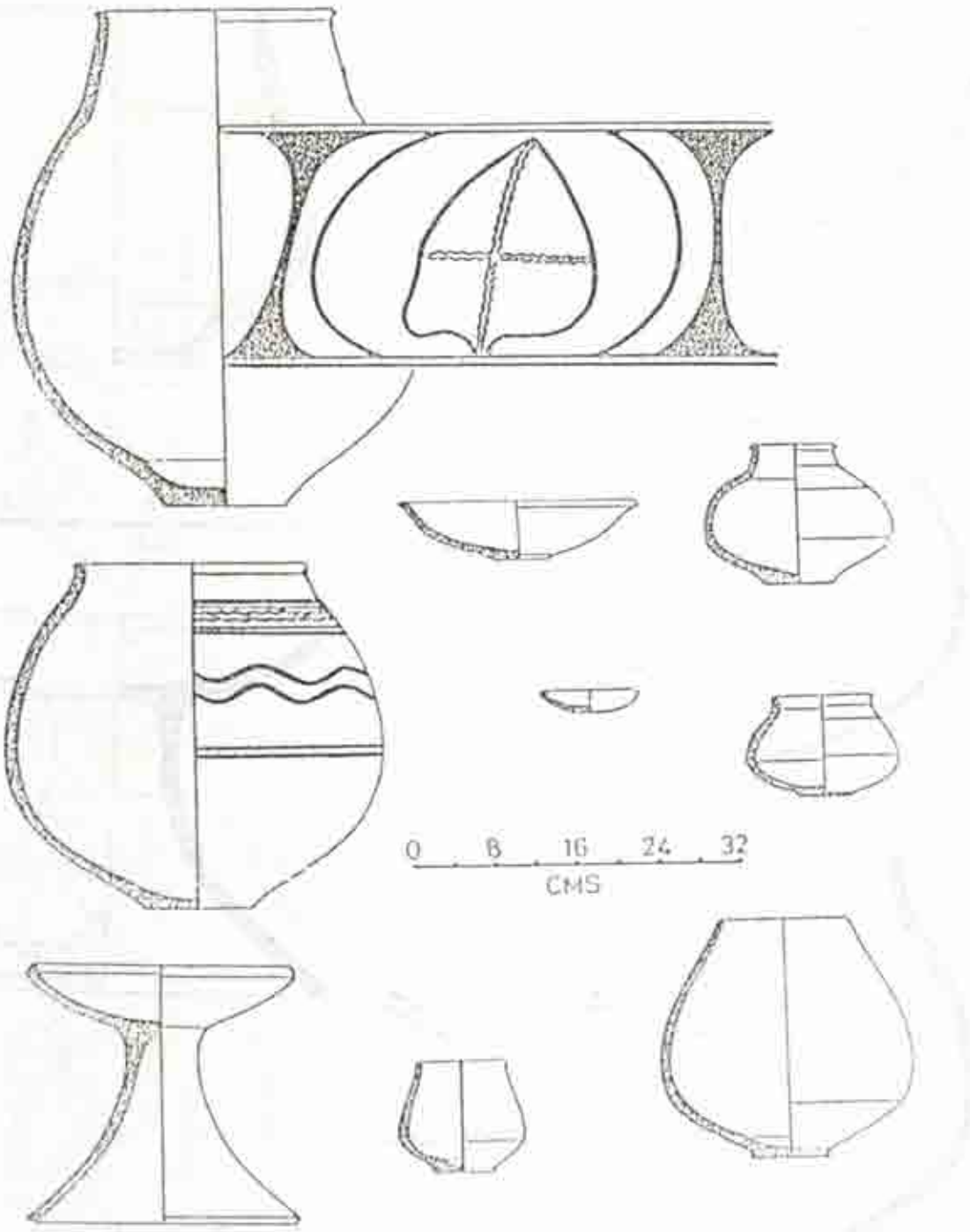


Fig. 1 : Nagwada Burials

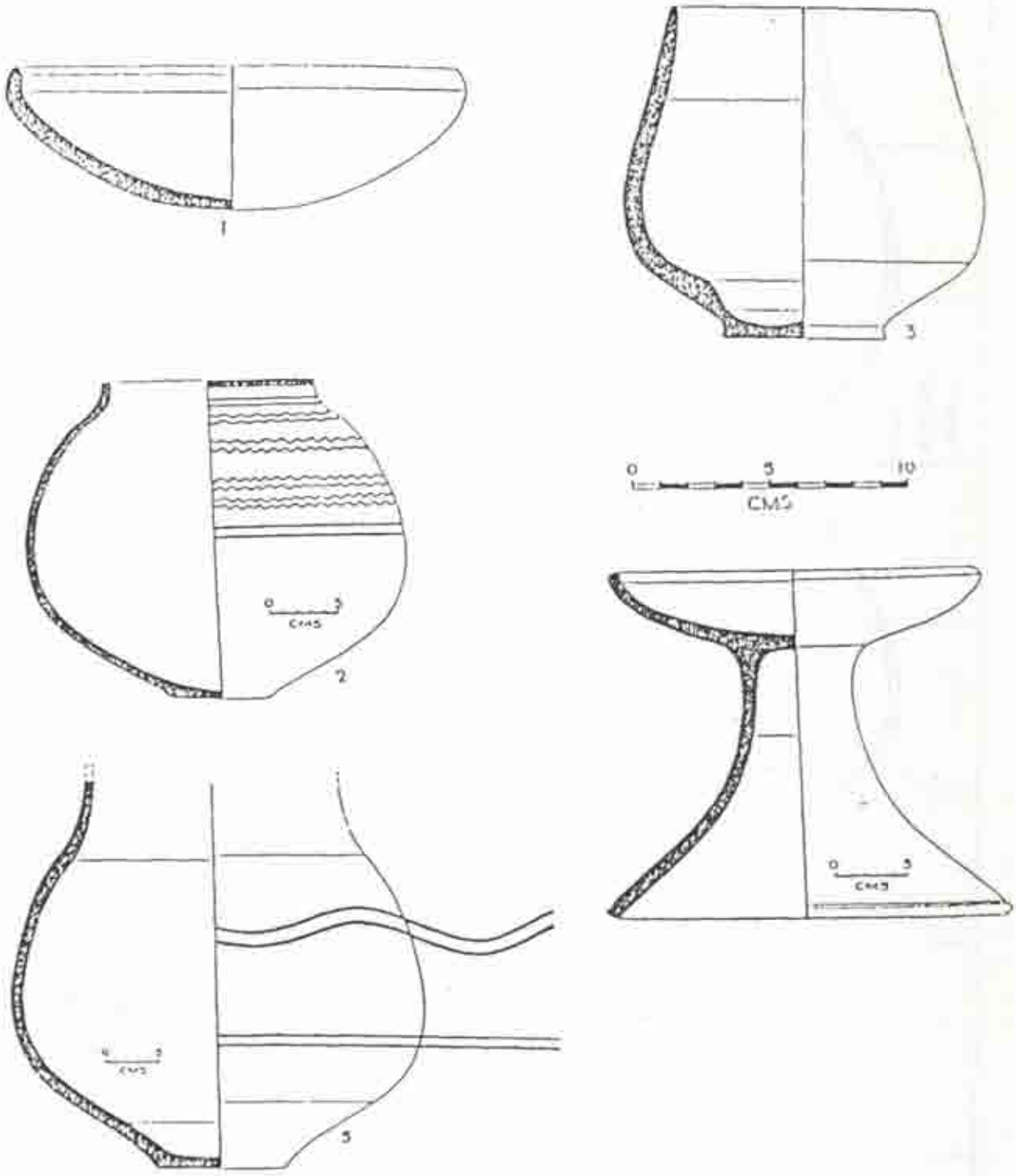


Fig. 2 : Nagwada Burials

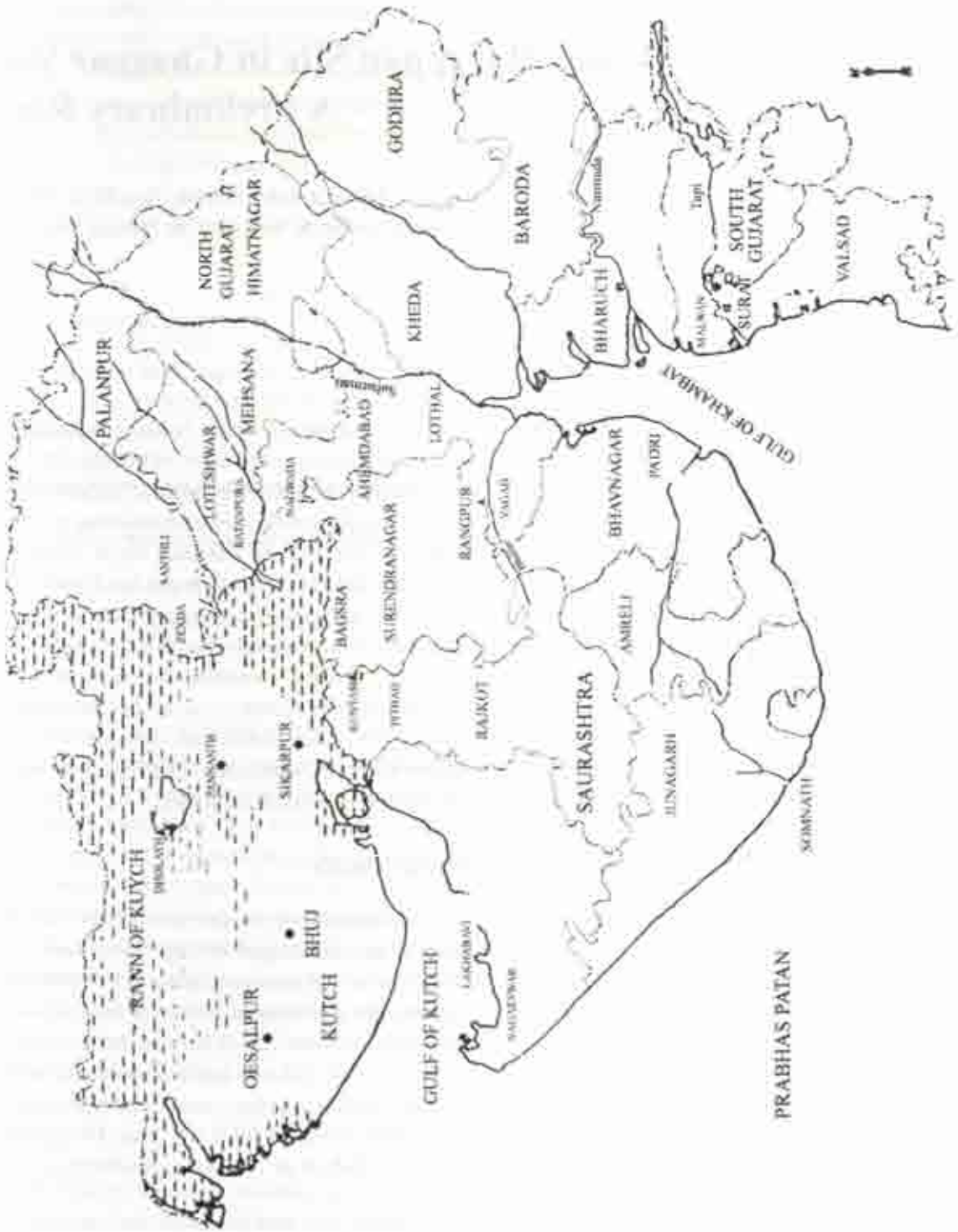


Fig. 3 : Gujarat Excavation Harappan sites

Baror – A New Harappan Site in Ghaggar Valley – A Preliminary Report

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The archaeological site of Baror (29° 10' N; 73° 19' E) is situated in Anupgarh Tehsil of Sri Ganganagar District of Rajasthan. It lies at a distance of about 100 km south-west of Kalibangan and about 13 km northeast of Anupgarh. The nearest railway junction is Suratgarh, which is about 60 km northeast of the site. However, a loop line starts from Suratgarh and terminates at Anupgarh. By road, either one can reach here from Jaipur or from New Delhi; both are almost equidistant at about 400-450 km.

The mound, measuring about 200 m east-west and 150 m north-south, rises to a height of about 11 m from its surrounding plains. The western portion of the mound is higher than the eastern part. The eastern portion is completely occupied as a graveyard by the Muslim community, hence a good number of modern graves have come up in this portion. Further, the western portion has been damaged considerably due to agricultural activities, providing a cliff section of about 2 m in the western part of the mound. On the flat top of western portion, there exists two *majars* of some unknown Peer Baba, which proved to be an obstruction during the excavation.

The mound, along with several other sites, was discovered by A. Ghosh in his explorations along the Ghaggar River soon after the Indian Independence, and was declared protected by Govt. of India in 1951. During 2004, the Ministry of Culture approved 'Saraswati Heritage Project' and decided to conduct excavations at Adi Badri, Hansi and Bhirrana in Haryana; Baror, Chak 86 and Tarkhanewala Dera in Rajasthan and Juni Kuran in Gujarat under this project. Before selecting these sites for excavation, the earth observation data collected by satellite were also taken into consideration, which confirmed the existence of Palaeo-channels of the lost Saraswati River. The analysis of these data further confirmed that Ghaggar follows almost the same course of the lost Saraswati River in Punjab, Haryana and Rajasthan.

Previous Work

L.P. Tessitori was the first scholar who surveyed the dried up bed of Ghaggar during 1916-17 and reported several *theris*, but associated them with "necropolises of Johiyas, the descendants of the ancient Uaudheyas" (Tessitori 1917 – 18: 22 – 23). Aurel Stein, during 1940-41, surveyed the Bikaner and Bahawalpur area (now in Pakistan), collected pottery, and termed it as Chalcolithic (Stein 1942: 174-82; 1989: 1-97). From 1950 to 1953, A. Ghosh, on behalf of Archaeological Survey of India

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explored this area discovering dozens of sites including Kalibangan and Baror (Ghosh 1989: 394-397). The Harappan sites explored by Ghosh were revisited by K.N. Dikshit (Dikshit 1980:32-34) and K.F. Dalal (Dalal 1980: 1-40). They confirmed the existence of pre-Harappan pottery in this region. Dikshit excavated Nohar and Sothi in 1978 and, in his exploration, confirmed pre-Harappan levels at Baror, Sherpura, Burgia, Binjore (G.B. 93) and Mathula (G.B. 95); whereas Dalal put up a trial trench at Binjore (G.B. 93) and noticed pre-Harappan deposit as 1.75m.

Objectives of Excavation

The excavation work was taken up in 2003-2004 by Urmila Sant and in 2004-2005 by T.J. Baidya, et al., with the following objectives.

1. To establish the cultural sequence of the site.
2. To know the town planning and settlement pattern of the site.
3. To identify the regional specialty, if any.

Layout

The trenches were laid out in horizontal pattern measuring 10 x 10 m each. The pegs were numbered in such a manner that the whole mound will come under 'A' zone. The trenches were laid out in the eastern part of the mound, and on those flat areas in the western side of the mound, which was earlier a part of the mound. In total, 65 trenches, fully or partly, were taken up for excavation during the two field seasons of 2003-2004 and 2004-2005. In order to get the sections of the mound from north-south and east-west direction, excavation work was taken up in a series of trenches numbering from M1 to M10 and from A3 to P3, along with other trenches (Fig.1).

Chronology

On the basis of Ceramic industries, antiquities and other cultural materials, recovered from two field seasons' work, a three-fold cultural sequence has been tentatively established (the materials are still under study).

Period I	:	Pre Harappan
Period II	:	Early Harappan
Period III	:	Mature Harappan

Excavations

Period I – Pre Harappan: The existence of a separate stratified horizon just above the natural soil is very important in this region. The evidence of this period was first identified from trench no. A7 during 2003-04. This trench is located about 55 m west of the mound over the flat area. Further westwards of this trench, agricultural land starts. In trench no. A7, bi-chrome painted sherds are found from layer 1, but suddenly from layer 5, the quantity of bi-chrome painted sherds reduced and further from Layer 6 and 7 different types of potsherds were noticed. Hence, once again, when excavation work was started in the season 2004-05, a trench was taken up for excavation about 75 m westward of the mound within the agricultural land. This trench was numbered as XB 3 Qdt.1. From here, nine layers were encountered during the course of the excavation. Since this area was under agriculture for quite sometime, the upper layers are somewhat disturbed. Pottery appeared from Layer No. 6 and 7 at the depth from 1.29 m to 2.52 m. These potteries are almost similar to those found from trench A7 layer 5, 6 and 7. These pots are made on wheel and are red to dull red in colour but their surface is devoid of any painting and their fabric is coarse to medium (Fig.2). However, some stray examples of black horizontal band were noticed on the rim of some sherds. Some of the pots show ill-firing and irregular striation marks, though it is made out of well-levigated clay. The main shapes are vases, storage jars, small sized vases and miniature pots, etc.

Since, the evidence of this period is found in a very limited area, no brick structures have been encountered belonging to this period. However, the occurrence of ashy bands and some postholes indicate that the first settlers of Baror used to live in huts made of wattle and daub or thatched roof.

Period II – Early Harappan: The cultural assemblage of this period may be compared with those of Kalibangan I. The remains of this period were found in trench nos.B7, C7, D7, E7, F7, B6, C6, B5, C4, C3, B8 A3, B3, C3, D3, E3 and K3. Among these trenches B7, C7, D7, E7, A3, B3, C3, D3 and E3 are located just west of the mound over the flat area. As mentioned above, these areas were flattened after cutting the western limit of the mound; hence, when we started excavation, the remains of Early Harappan period were noticed almost immediately, since the upper deposits were almost completely removed by the landowner.

This period is marked with potsherds made on fast rotating wheel with bi-chrome painting on its surface. The surface is red to dull red in colour on which paintings were done with black colour, then with the help of evanescent white pigment the gaps were filled and additional dashes and dots were added. The painted designs comprise of horizontal bands, loops, wavy lines, concentric arches, meanders, moustache motifs, row of dots, crosshatched triangles and semi circles. Some floral and faunal motifs were also found on the surface (Fig.2 & 3). All six fabrics reported from Kalibangan are also present here (Lal *et al* 2003: 101 – 105). The main shapes are vases, basins, bowls, dishes-on-stand, lids, etc.

No major brick structures have been found belonging to this period, except some flimsy structures exposed in trench no. E7. The remains of at least four different walls have been exposed in this trench, but they do not form any regular shape. Even the brick sizes of these structures are 50 x 20-25 x 8-10 cm and they do not match with the standard ratio as found at other sites from Early Harappan levels. Thick mud mortar has been used as binding material.

The presence of ashy bands, sometimes thick deposit of ash in the Early Harappan level, hint that the people of this period used to live in huts made of perishable materials. A good number of postholes were also encountered. Several hearths were also exposed. Their shapes are either circular or oval and filled with ashes, potsherds and bones.

From the above circumstances, it seems that the Early Harappan settlers of Baror did not use mud bricks profusely for constructing their houses, rather they spent their lives in huts of wattle and daub and attained perfection in manufacturing of pottery especially in the painting and decoration aspect.

Another interesting finding of this period is the exposition of a water channel or canal-like structure constructed after digging the soil in 'V' shape. The total exposed length is about 40 m running in the north-south direction. It was completely filled with sand.

Period III - Mature Harappan: This period can be defined as a culminated or mature phase of Baror in all respects. The ceramic industry of this period is marked by Red Ware and Red Slipped Ware made on fast wheel with well-levigated clay and characterized by its typical painted design with black pigment. The designs are geometrical but some times naturalistic also. The paintings are done on carefully prepared red ground. Paintings are found mainly on the upper part and the lower portion is decorated with black bands, but a few examples of paintings all over the body are also reported. The realistic motifs consist of curvilinear brackets, diamond-shaped checks, human figurines, birds, fishes, animals, trees, fish scatters, loops and *pipal* leafs. The main shapes are dishes-on-stand, basins, dishes, beakers, vases, goblets and perforated jars, etc (Fig. 4). The fabric D of Period II is still continuing in this period; the same occurred even at Banawali and Bhirrana (Bisht 1982: 118, Rao 2004: 20-23).

The remains of this period were found from trenches numbering F7, G7, H, J7, K7, L7, H6, J6, L6, H5, J5, H4, J4, G8, G10, G11, F3, G3, H3, J3, K3, L3, F4, G4, K4, L4, G5, G6, K5, L8, L9, L10 and from M1 to M10. The structural activities of this period witnessed distinctive town planning and profuse use of mud bricks for construction purpose. Remains of this period were visible after simply removing the humus from the top soil.

The well-planned layout of the township is the most

important feature of this culture. However, during two field seasons of work, only 20 % of the mound has been exposed, the evidence of their skilful architectural planning reflects from the exposed houses and lanes. The most outstanding features of these structures are oriented in either conventional east-west or north-south direction. Since all the structures are constructed with mud bricks and as mud-bricks have a very short life, several phases of reconstruction were also noticed.

A 30 m long lane, oriented in north-south direction was exposed in trench nos. H5, H6 and H7. The lane is 2 m wide. The fragments as well as intact terracotta cakes and *mushtikas* found abundantly on the surface of the lane further suggest that these were laid on the surface of the road. Some house plans were also exposed towards the east of the lane. These houses were separated with each other by sub lanes. The rooms of these houses are either square or rectangular.

Hearths of various sizes and shapes were also exposed from this period. Their shapes are either circular or oval. Ashes, bones and charcoal were found from the hearths. On some of the hearths, earthen pots were also found, kept in-situ, which indicates that the people of this period were in a hurry while migrating from this place. In some of the hearths, an erect brick was found, standing on its side, in the centre. A big size furnace/kiln was also exposed in trench no.G4. The shape of this furnace/kiln is almost circular with diameter of 2.60 m. and circumference of 8.12 m. Its mouth is projected in the east direction is about 1.10 m long and 55 cm wide. The sidewall of this furnace is made of bricks, which are arranged on their side.

The remains of fortification were also traced in trench no. M3 (northern part) running in the east-west direction. It was further traced in trench nos. N3, P3 and L3. It seems that initially the fortification was constructed by accumulating mud with a triangle section, afterwards seven courses of mud bricks were arranged in English bond. The width of this wall is about 3.55 m.

Antiquities

The excavation has yielded a good number of antiquities, which may be grouped as terracotta, stone, shell, bones, ivory, steatite, faience paste, copper and gold object. Terracotta objects include human figurines (Pl.7), animal figurines (Pl.13), beads, bead spacers, bangles, ear ornaments, pendants, sling balls, hopscotches, toy cart frames (Pl.14), toy cartwheels, tops, gamesmen, whistles, spools, net sinkers, tiles etc. Human figurines represented both sexes. However, a singular male figurine (Pl.6) deserves special mention. Measuring 6.4 x 4.6 x 3.5 cm, it is a fine specimen of Harappan art made out of well-levigated clay. Heads, forearms and legs are missing. Hands, legs, chest and back are decorated with incised nail marks and remind us of the *Pasupati* figurine on the Indus seal. A short tail was also found below the waist. The naval part marked by an incised dot, anus by an incised dot within a circle and an erect male genital (partly broken) are the main features of the specimen. It may be a composite figure of a lion and a man. Female figurines are generally characterized with thin waist, broad hips, pinched nose, eyes, mouth and naval. Genitalia are indicated by incised dots. Below the neck, the body of the figures is decorated by rows of incised dots and the turban is slightly bent towards the left.

Among the animal figurines, bull is dominating, but cow, ram and dog are also found. A noteworthy hand-made bull figurine (7.5 x 5.00 x 8.00 cm) (Pl.12) was found from the Early Harappan period. Whitish slip has been applied on the surface and the eyes and eyebrows have been indicated by black paint. The forehead and the body are also decorated with it. A head of a ram (4.9 x 5.5 x 3.1 cm) with back sweeping horns found from the Mature Harappan level deserves attention. The eyes and nostrils are formed by incised dots and the mouth is indicated by incised line.

Terracotta beads (Pl.8) of different sizes and shapes like spherical, barrel, tubular, bi-conical and semi-circular tabloid etc. are also found. Terracotta bangles can be classified into three types.

(i) Roughly circular, square or ovoid section with or without red slip.

(ii) Painted bangles, which are decorated with yellowish paintings on red slip.

(iii) Segmented bangles with two or four strips.

The bangles of the first type have been revealed from both periods. Painted bangles have mostly occurred in Period II. The third type of bangles has been mostly recovered from Period III.

Among the terracotta play objects, a hollow bird-shaped whistle (3.5 x 3.2 x 6.00 cm), games-man in tetrahedral shape and truncated cylindrical shape from Period III are noteworthy. Three fragments of tiles found from Period III decorated with the incised intersecting circles on one side indicate the architectural aesthetic sense of Mature Harappan people.

The excavation has also yielded numerous stone objects from various levels. It includes beads, blades (Pl.3), points, weights (Pl.19), querns, pestles, sling balls, gamesman, etc. The beads of different sizes and shapes (Pl.16) are made of carnelian, jasper, lapis-lazuli, agate, quartz, amazonite etc. A long barrel shaped agate bead having a length of 5 cm and etched carnelian beads (Pl.15) from Period III deserve to be mentioned. Querns are almost rectangular or ovoid in shape with slightly concave shallow working surface and a convex base. Pestles are mostly rectangular or trapezoidal in shape with flat grinding nature.

Gamesmen made out of black and green jasper, having a truncated cylindrical body with the head demarcated by a grooved line, varying in height from 1.2 to 1.8 cm, were found from Period III indicating that some sorts of game might have been played as pastime.

Shell objects include bangles (Pl.17), rings, beads and head ornaments. Noteworthy bone objects (Pl.4) include styluses, points, beads and ceremonial knives. Ivory objects (Pl.4) include playing disc, bangle, ring and stylus. Beads and bangles made out of faience, paste and steatite have also found. Imitation of etched carnelian and agate beads in steatite from Period III deserve attention.

A good number of copper objects (Pl.5) have also been recovered. These objects include fishhooks, arrowheads, spearheads, chisels, bangles and rings. The site has also yielded gold beads (Pl.18) of various sizes and shapes like short barrel-shaped, circular-shaped, disc-shaped, etc. Besides, a solid *bindi* (disc) and a fragment of a gold ornament were also found. A gold-plated bead was also recovered from excavation. These gold objects found from the Mature Harappan level indicate the artistic skill of jewellers and the prosperity of the Harappan people at Baror.

We also recovered seals of steatite and shell from the excavation. Button-shaped seals (Pl.20) found in Early Harappan levels having geometric, incised decoration and two perforations in the centre like a button deserve special attention. Steatite and shell seals (Pl.21) with geometric designs on the obverse and small perforated knob on the reverse were also found at the early phase of Mature Harappan level. A remarkable average square steatite seal (2.4 x 2.3 x 1.00 cm) (Pl.22) with rectangular section and a perforated segmented boss on the reverse has been recovered from the Mature Harappan level. On the obverse, we can see stylistic unicorn animal with fire alter and five Indus signs neatly engraved in the upper panel.

Conclusion

The materials recovered from the excavation at Baror are still under study. The discovery of a separate horizon represented with un-painted Red Ware below the horizon marked with bi-chrome painted sherds, hints towards new information in the eastern regions as suggested by J.P. Joshi (Joshi 1985: 51–54) which gives Baror a separate identity. Even, the excavations at Chak 86 and Tarkhanewala Dera, which are located just 11-12 km west of Baror, yielded PGW and Mature Harappan elements respectively (Trivedi and Patnaik 2004: 30-34).

The presence of mud appliqué ware (imbricate type) of hand made, thick fabric, tempered with clay, termed as Hakra Ware by Mughal, is also very interesting (Mughal 1993: 85-96). At Baror, there are no breaks between the above-mentioned three periods. For identification of floral and faunal remains, concerned Government Organizations were contacted but their results are still awaited. In the later phase of period III, a remarkable deterioration was observed in terms of pottery as well as structures, this indicates degeneration of the mature period before migration from Baror. Moreover, the excavations at Baror and other sites of the Ghaggar valley have reopened the forgotten discussion about the nomenclature of this culture, that whether the entire civilization may be renamed as Saraswati (Hakra) civilization, or not?

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Fig. 1 : Site cum contour plan at Baror

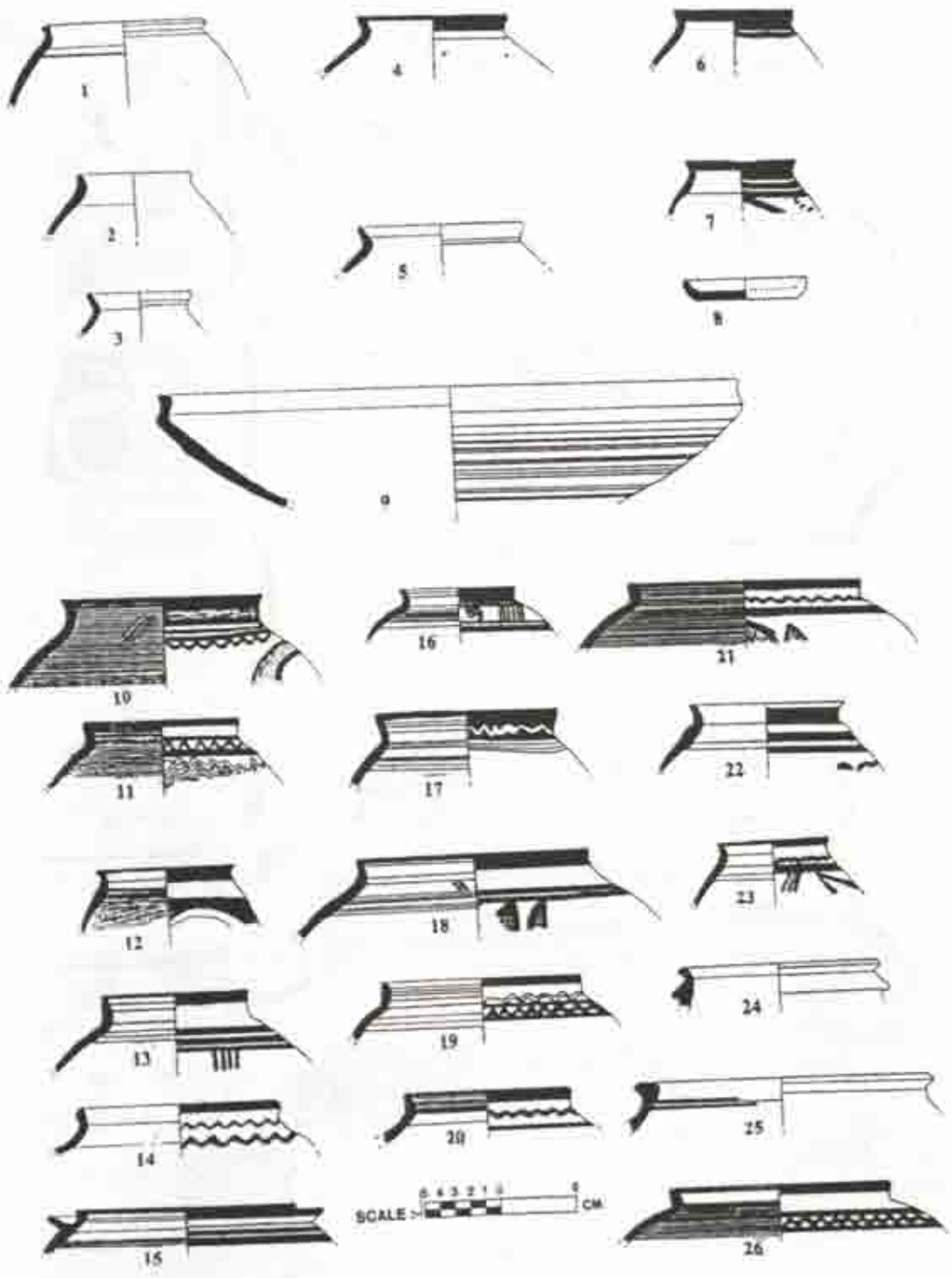


Fig. 2 : Pre-Harappan (1-9) & Early Harappan (10-26) pottery at Baror

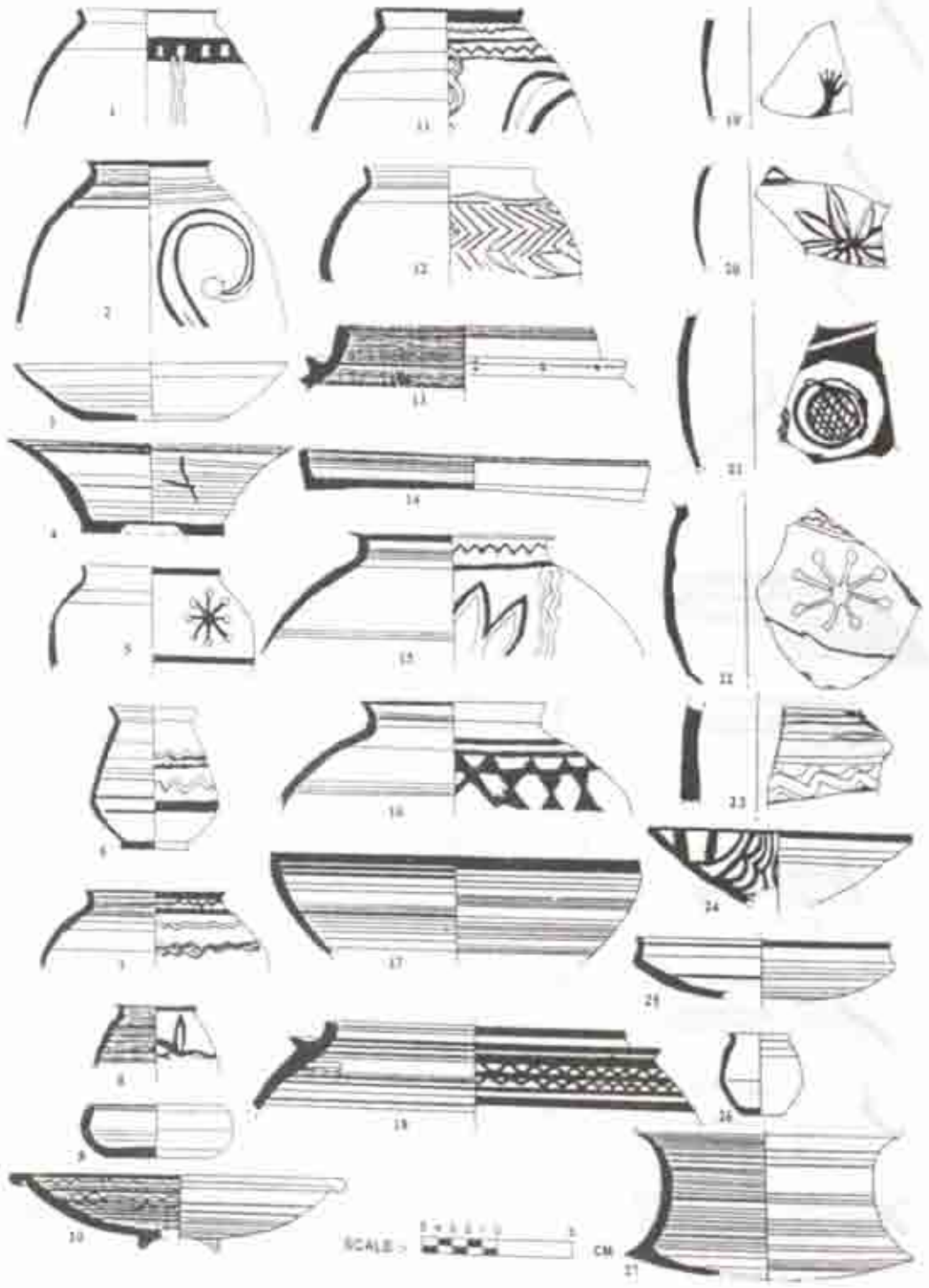


Fig. 3 : Early Harappan pottery

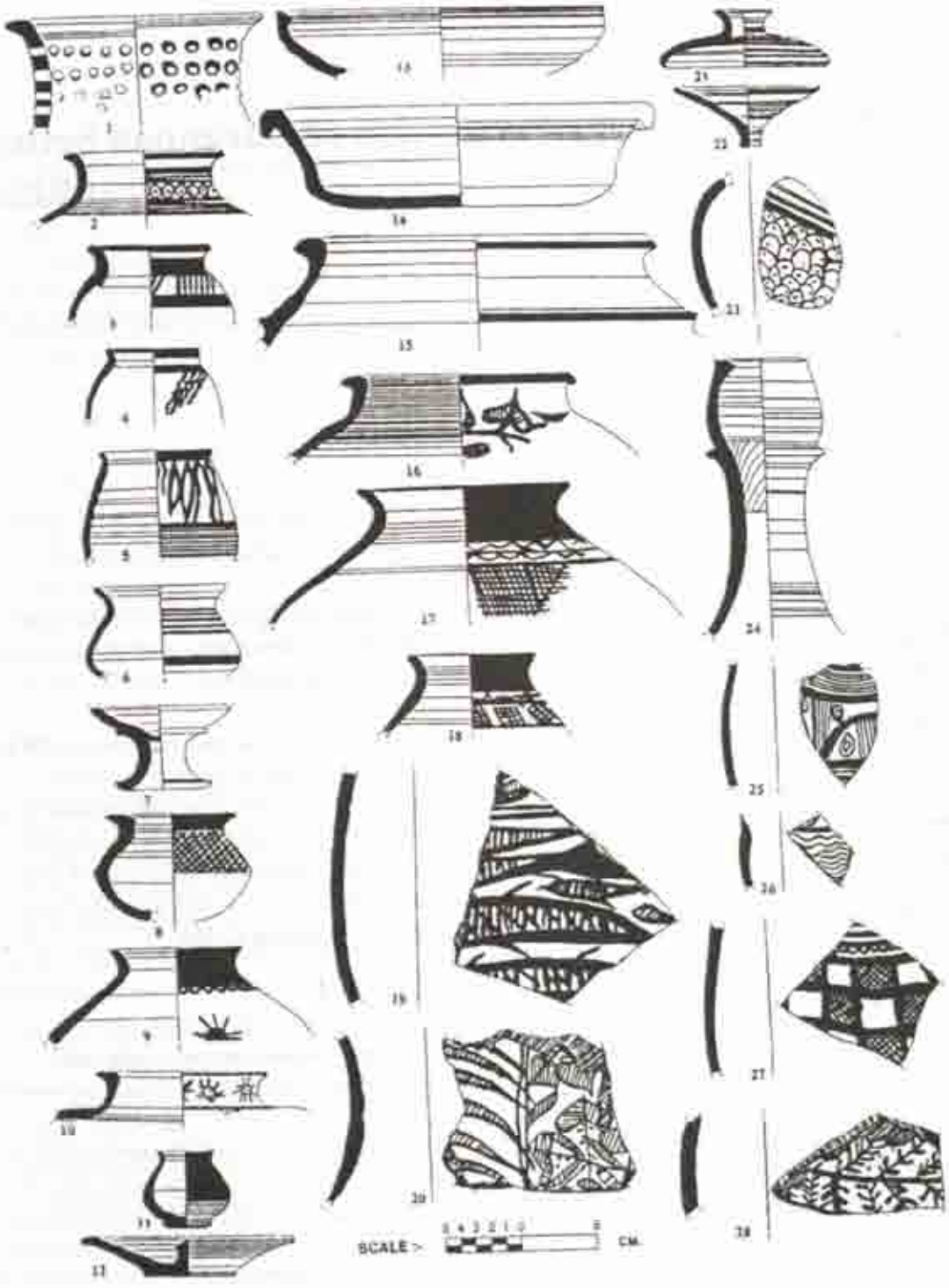


Fig. 4 : Mature Harappan pottery at Baror

New Light on the Excavation of Harappan Settlement at Bhirrana

L.S. Rao, Nandini B. Sahu, Prabash Sahu, Samir Diwan & U.A. Shastry*

The excavation at Bhirrana, District Fatehabad, Haryana (29°33' N; 75°33' E) has brought to light the remains of a gradually evolving Harappan settlement from a modest inception to a full-fledged maturity. (Rao *et al.* 2004). In the second season (2004-05), 71 trenches were excavated with the following objectives:

1) For detailed study of the town planning of the Mature Harappan period.

2) To identify the dividing line, if any, between the Citadel and the Lower Town.

3) To locate the extent of the fortification wall towards north, south and east.

4) To study the nature and purpose of the circular structures found within the habitation.

5) An intensive study of the Early Harappan in view of the considerable deposit of 1.70 m and to know the nature of pit dwellings.

These excavations have brought to light many new evidences regarding the gradual evolution of a complex Harappan culture, without any break from the period of initial settlers at the site. This has necessitated redefining of the cultural sequence, hypothesised as per the last season's excavations (2003-04). The new proposed sequence is enumerated below:

Sequence of	Cultures (2003-04)	Proposed Sequence of Culturs (2004-05)	
Period I	Early Harappan	Period I A	Hakra Wares Culture
		Period I B	Early Harappan
Period II	Transitional	Period II A	Early Mature Harappan
Period III	Mature Harappan	Period II B	Mature Harappan

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Period I A: Hakra Ware Culture

The earliest settlers at Bhirrana were the people using pottery similar to those, as reported by Mughal, from Cholistan, popularly known as Hakra Wares. (Mughal, M.R. 1997). Similar pottery has also been reported from the neighbouring site of Kunal, as the wares of the earliest settlers. Another hallmark of this cultural phase (Pd. I A) is the typical habitational pattern, which is represented in the form of subterranean dwelling pits. The excavators claim that Hakra Wares were the predominant ceramics in addition to the bi-chrome wares with black outline and white filling. (Khatri, J.S. and M. Acharya. 1995).

The excavations at Bhirrana have lent support to the evidences' unearthed at Kunal with the exception, that the Hakra Wares exclusively dominated the lower cultural deposit inside the dwelling pit; whereas the presence of bi-chrome ware in association with Hakra Wares was noticed at the upper levels. Thus, the Hakra Ware cultural phase enjoys a distinct personality in the overall cultural complexes brought to light in this region.

Dwelling Pits

On the slope of the northern periphery of the main mound, a cluster of subterranean circular pits of different dimensions represent the dwelling pit complex of early inhabitants of the area. (Pl. 1). The pits are directly cut into the natural soil and are bereft of any superimposing cultural deposit of the subsequent periods. Altogether nine pits, numbered numerically from 1 to 9 were opened. Pit nos. 2, 3, 4 and 6 were used for dwelling purposes; 5, 7 and 8 were sacrificial/industrial pits; whereas pit no. 9 was a refuse pit and belonged to the Mature Harappan period.

The dwelling pits are shallow in depth, varying from 34 to 58 cm, with a diameter of 230 to 340 cm, which appears to be sufficient enough to accommodate inside three to four persons. The walls and floors of these pits are plastered with self-same earth of yellowish alluvium. In one of the pits, a chunk of reed-impressed earth was recovered, which implies the existence of feeble superstructure of wattle and daub. Pits numbered 5, 7 and 8 probably served the purpose of a sacrificial and/or kitchen space, as is attested to, from the finds of charred bovid skulls along with other charred bones, horn, pottery and ash. In pit number 7, a number of fragments of crucibles with specks of molten copper still sticking to them, suggest their use for industrial activities. Interestingly, no postholes near the pits were noticed.

Such dwelling pits, cut again in the natural soil, were also encountered in the main mound from the earliest levels in trenches A1, B1, YH5 and XF3. These pits are in their mature phase, but the contents are similar to the pits found in the northern periphery. In trench B1, besides a dwelling pit, a roughly circular mud-plastered platform and a single mouthed hearth was exposed which suggests that cooking was probably not done inside the dwelling pit (Pl. 2).

Ceramics

The most noteworthy feature of this period, are the ceramics, recovered from the pits, which are very similar in terms of , shape, fabric and surface treatment to the "Hakra Wares" as reported by Mughal from the Hakra river basin in Cholistan. However, a few deviations were observed which could be termed as regional variations. The Hakra Ware repertoire at Bhirrana occurs in a separate horizon without any intrusion of any type of novelty. This site has yielded profuse mud appliqué ware in comparison to the incised varieties. (Mughal, M.R. 1997).

(I) Mud Appliqué Ware: The pottery, in this category, is represented usually by medium to thin bodied wheel made pots. A thick coat of mud is applied. In some cases the mud is applied directly on the pot surface. The entire body of the pot is interspersed with white quartz granules. The appliqué in some pots is on the entire exterior surface below the neck and in some up to the belly. Though often made on slow wheel, the pots are not well finished and the surface colour varies from dull red to grey. The rims are often painted with a band, externally as well as internally. The usual shapes in this category are globular pots and heavy bodied storage jars. Heavy bodied storage jars have thick

mud coating and are hand made; whereas thin to medium-bodied globular pots have thinner coating and are wheel made. The latter type predominates in Bhirrana. The rims are simple, rounded, everted and at times slightly out-turned. The firing is usually not good. This variety continues in a slightly modified version, in the upper levels. However, the surface colour changes to bright red and the appliqué design looks more like rustication.

(II) Incised Ware: Two distinct categories of incised ware were seen in the Hakra repertoire. Though distinctly different from each other, the two types had a few common features, which would be worth discussing in the beginning. The incisions were executed on the vessels directly without any slip. The surfaces were at-times, smoothened or left undulated. The vessels were made on slow wheel and well fired. The incisions were executed from the shoulder level, while the neck and the rim were covered with a broad black band. Handled pots (jugs) were common in both the categories. The two categories mainly differed, in surface design, as one was deeply incised on the exterior, while the other had light incisions. Shapes having everted and rounded rims represented both the categories.

(i) Deep Incised Ware: Generally it is red to bright red in appearance, without any slip. Pre-firing incisions, with a sharpened reed or similar object, were executed on the exterior portion from shoulder to belly. The incisions were usually bordered by black bands on either side i.e. on the shoulder as well as on the belly. The patterns were usually rows of chevrons and criss-crosses. The usual shapes were small vases, handled vases [jugs?] and lota like vessels (Pl. 3).

(ii) Light Incised Ware: Ceramics belonging to this category were usually small vases, handled vases (jugs) and lota shaped vessels. The incisions were mainly confined to wavy lines executed probably with a comb like object. The incisions were directly executed on the surface between shoulder and belly without any slip. Two or three incised parallel lines on the either sides usually bordered the wavy incisions (Pl. 4).

(III) Tan Slipped/Chocolate Slipped Ware: The entire pottery assemblage included this type of pottery from all the levels. However, a few variations in the texture were seen. These wares were well fired having medium to fine fabric. Tan or chocolate slip was applied from the rim to the base, sometimes only on the neck portion and sometimes up to the belly. When the slip exists only on the neck portion, there is no internal rim band; whereas the other varieties, with slip up to the belly and base were invariably decorated with rim bands and sometimes with vertical strokes emanating on the internal side of the rim. Globular pots with everted rims were the essential representative shapes in this category, along with a miniscule number of straight-sided vases, splayed out straight walled bowls, troughs and ring base pots. All these later shapes have tan or chocolate slip right up to the base (Pl. 5).

(IV) Black Burnished Ware: In this category only a few sherds were found from the site. This variety is represented by shapes like concave-sided bowls, squattish pots with blunt carination at the waist, straight sided bowls etc with featureless /slightly everted/ slightly rounded/ out-turned or tapering rims. One of the pots had a pre-firing graffiti 'X' on its base (Pl. 6).

(V) Brown on Buff Ware: A single sherd of a straight-sided vase with out-turned rim represents this ware. Of medium fabric and not well fired, this vase is painted in brown colour with five horizontal bands below the neck and another band of festoon suspended from the last band (Pl. 7).

(VI) Bi-chrome Wares: The shapes encountered in this ware are mainly vases and bowls. The painting is executed on the exterior over red slip. The outline of the motifs is in black, whereas the interior is filled with evanescent white. The painted motifs are geometric and floral (*pipal* leaf being the favourite motif in the later variety) (Pl. 7).

(VII) Black-on-Red Ware: The common shapes in this category are mainly vase, bowls and cups. The painted repertoire is essentially geometric in nature comprising of

lines, loops, criss-cross, triangles, etc.

(VIII) Red Ware: Simple red wares with common shapes like vases, bowls and cups made on wheel, were also found associated with the above categories. All the shapes are of medium fabric showing slightly oxidised core and are devoid of any slip.

Antiquities

The antiquarian remains from the dwelling pits comprise of beads of semi-precious stones like carnelian, agate, jasper and lapis lazuli; terracotta bangles (both plain and painted) with circular and rectangular cross section; sling balls of terracotta and sand stone; unbaked triangular clay cake; quern and pestle of sandstone; crucible; hopscotch fashioned on pottery; a solitary piece of chert blade and a bone point.

Period Ib : Early Harappan

The structures of the Early Harappan period were exposed on the southern slope of the mound where there is no deposit of the later periods. The structures are in bad shape due to erosion and pit activities of later periods. The extant structures are made of mud bricks in the ratio of 1:2:3 and are in the north-south direction with a deviation of nearly 20°. It may be recalled from the last year's report (2003-04) that the orientation of the Mature Harappan layout deviated to 24° from north. A house complex of six rooms and a courtyard in the centre, which houses the *chullahs*, has been exposed.

The ceramic repertoire of this phase comprises, in addition to the already known six fabrics of Kalibangan, the bi-chrome wares, a few sherds of light incised wares and tan/chocolate-slipped wares of the preceding period with little morphological changes. In case of the tan/chocolate wares, the slip on the exterior surface gets confined to the waist portion only.

The important find from the surface is a fragment of a button seal made on shell. From the extant portion it may be presumed that in its full form it looked like a quarter-foil shape, each arm bearing five concentric circlets with a blind perforation in the centre. Almost in the centre of this seal, a partly preserved groove of perforation can be seen. The other antiquities recovered from this phase include arrowheads, rings and bangles of copper; beads of carnelian, jasper, steatite, shell and terracotta; pendant, bull figurine, rattle, cake, wheel, gamesman and marbles of terracotta; bangles of terracotta (plain and segmented) and faience; bone objects; sling balls, marbles and pounders of sandstone.

Period II a : Early Mature Harappan

This re-defined cultural sequence, [Period II, the Transitional Phase, of the last year's cultural sequence (2003-04)] has been equated and re-designated as Early Mature Harappan phase. The term 'Transitional' does not connote a particular cultural phase in definite terms, as the term can be used whenever or wherever two cultural phases co-mingle. Further, its usage becomes cumbersome when two or more co-mingling situations are noticed within a gradually evolving and unbroken cultural complex, as has happened in Bhirrana.

However, during the season (2004-05), not much information could be chanced upon about this phase.

Period II b : Mature Harappan

Northern Arm of Fortification Wall

To trace the fortification wall of Mature Harappan period, a series of trenches were subjected to further digging, as a result of which a massive fortification wall has been exposed to a length of 95 m with a width of 5m having seventeen courses. Built of mud bricks falling in the known ratio of 1:2:4 (10 x 20 x 40 cm and 9 x 18 x 36 cm), this fortification wall rises to a height of 1.80 m with a plaster coating on its external face. Mud brick paving was noticed along the northern arm of the fortification wall, the purpose of which might be understood in the next season's work.

A burnt brick drain, provided in the thickness of the northern arm of the fortification wall, was exposed in Trs. YD6 & YD7. The size of the burnt bricks used was 9 x 18 x 36 cm. It was exposed to a length of 3.0m north-south and 2.10m east-west. The width of the drain wall is 60 cm whereas the channel measures 40 cm wide.

Southern Arm of Fortification Wall

During the last season's excavation, (2003-04), the southern arm of the fortification wall of Mature Harappan period, running in east west orientation, was exposed to a length of 46 m. Further excavations of the same, has revealed that the fortification wall takes a turn towards south, which has been exposed to a length of 25 m. The width of the wall is around 2.50 to 2.75 m. This arm also needs further excavation to know its terminal end.

A massive mud brick wall of 3.75 m width was exposed to a length of 20 m in Trs. ZK1 & Z11, the nature of which can be ascertained by further probing, in the coming season.

Mature Harappan House Complexes

One of the objectives of this season's excavation was to expose complete house plans of the Mature Harappan period. Three such complexes have been exposed in the eastern, central and north-western sides of the mound. The central house complex is partially exposed and has four rooms, flanked by a lane towards the east, which joins a north-south running street. Two house complexes have been exposed in the eastern side divided by a narrow lane running north-south. The complex towards north has 10 rooms with a *verandah* and a courtyard. The floors contain terracotta cakes mixed with ash and clay. Another house complex, in the northwestern side of the mound along the western arm of the fortification wall running north-south, consists of six chambers, kitchen, an open courtyard in the centre, three corridors and an open *veranda* (Pl. 8). The house complex is bound by two lanes running east-west on both side, and a major street running north-south along the fortification wall on the west. The chambers measure 4.10 x 2.20 m; 3.70x2.60 m; 2.80 x 2.80 m; 6.70 x 3.70 m; 8.0 x 4.0 m; 4.0 x 3.40 m. The three corridors measure 0.64 m; 0.84 m and 1.20 m. The courtyard is large and measures 6.60 x 5.80 m. The *veranda*, to the east, has not been fully exposed. An entrance of 1.20 m width is provided on the western side from the main street.

The floors of the chambers are paved with mud bricks. In the courtyard, a circular *tandoor* and a *chullah* with its mouth to the west have been exposed. The kitchen adjacent to the courtyard houses another *chullah*. Charred bones and the skull of a bovine animal was found besides one of the *chullahs*. The width of the outer peripheral wall measures 1.20 m and the inner walls are 0.57 to 0.80 m wide. Built in English Bond style, the walls are beautifully plastered with alluvium of yellowish colour, which is in fact the natural soil in the mound. It is from this plaster, in one of the chambers that an Early Harappan seal was recovered.

Streets and Lanes

This season's excavation has brought to light a major street running north-south along the fortification wall and three lanes, two of which, run east-west and one north-south. All these belong to the Mature Harappan period. The major street is 4.80 m wide. The lane on the eastern side running north-south is 1.60 m wide; whereas the lanes on the western side are about 1.80 to 2.80 m wide.

Ceramics

The ceramic assemblage of the Mature Harappan period is well represented by the known shapes and fabrics. The painted repertoire includes geometric, floral and faunal motifs. One of the sherds of a storage jar depicts two stylized peacocks and *pipal* leaves (Pl. 9). A large number of complete specimens of goblets were collected.

Antiquities

Seals: Altogether four Mature Harappan seals made of steatite have been reported from the site. The most noteworthy, is a seal made on black steatite, which depicts a three-headed animal, those of a bull, unicorn and a deer,

with a standing horned deity. The latter with his right hand holds the neck of the deer; where as the upraised left hand is shown with raised fingers. A manger is also shown in front of the animal. Interestingly, this seal doesn't bear Harappan legend (Pl. 10). The remaining seals are typical Mature Harappan seals with animals and legends.

Dancing Girl: The fragment of a thick sturdy red ware bears an incised figure of a dancing girl. It is a highly stylised caricature whose torso resembles that of an hour glass covered with horizontal hatching, upon which a partly damaged round head is placed. The right arm is displayed in a keen bow posture and the left is suspended by its side. Damaru shaped armlets adore the upper arm of the right hand. The thigh part of the body is indicated by vertical stokes. The left portion is missing and the sherd is broken. The overall posture of the figure stands out as a reminiscent or a close replication of the famous bronze Dancing Girl from Mohenjo-Daro.

Stylised Terracotta Animal Head with Horns: A good number of hand made stylized terracotta horns with a symbolic head painted in black (Pl. 11) belonging to the Mature Harappan Period have been unearthed. In these examples, the head or snout-portion is represented by a rectangular projection with faint concave sides at the bottom upon which, along the marginal sides of the broad forehead, rise incurving horns with rectangular cross-section. But in some cases, there are no rising horns, but abrupt terminal ends on the sides. A few of these objects bear cross bands painted in black/chocolate colour at regular intervals and in some cases; these bands are painted all around horns.

Another interesting feature of all these objects that attracts immediate attention is the presence of a bold perforation on the snout portion and varying number of perforations of different dimensions, provided in horizontal alignment, over the forehead and further extended on to the horns. These perforations were bored when the clay was in leather hard condition. But a few of these horns have both pre-firing and post-firing, deep and shallow, grooves cut on the inner face of horns. One most interesting feature that has lent an element of realism to one such highly stylised object is the presence of two blind perforations as nostrils, with a dividing shallow depression in between, on the lower part of the snout. This indeed is a close imitation of the upper lip of the cattle.

Terracotta Tiles: Fragments of terracotta tiles with intersecting concentric circle were found inside the houses, which were used for flooring purpose as is also reported from Kalibangan.

Other Terracotta Objects: The most interesting object in terracotta includes an animal head having three bodies, one of which is missing. The extant body, especially the mane portion bears nail impressed decorative motif (Pl. 12). Among the other important terracotta objects, mention may be made of bangles (plain and painted), single hub wheels (some with spokes painted in black) (Pl. 13). These are reported from the site in good numbers. Besides these, a terracotta bull bearing bands of black paint on its body and an object with a blind perforation at the bottom, resembling a *pipal* leaf are the other noteworthy finds.

Weights: In total twenty-five weights have been reported

Table : Details of weights found at Bhirrana.

Regd. No.	Tr. & Qdt	Stratum	Locus/ Depth	Material	Weight (in gm)
184	ZE2/II	2	30-35 cm	Sandstone	888.88
801	C1/II	2	57-65 cm	Sandstone	20.4
1189	F2/IV	5	125-140 cm	Sandstone	26.46
1262	F2/IV	5	140-150 cm	Sandstone	25.41

1963	YF1/IV	2	35 cm	Sandstone	56.36
2139	Surface	Surface	Surface	Sandstone	26.91
2163	XE1/II	3	48 cm	Sandstone	53.35
2180	Surface	Surface	Surface	T.C.	13.53
2302	YE1/III	2	65 cm	Basalt	13.53
2369	YD1/III	2	70 cm	Sandstone	90.91
2536	A2/II	1	50 cm	Sandstone	3.63
2581	A2/II	1	0-70 cm	Sandstone	15.44
2781	YA2/II	3	180-195 cm	Agate	13.9
2801	ZB2/I	1	50-60 cm	Sandstone	41
2943	YG7/II	1	10-20 cm	Agate	7.69
3106	ZA4/II	1	55-80 cm	Sandstone	29.5
3193	ZB5/III	1	18-20 cm	Agate	1.75
3220	ZG1/I	1	0-10 cm	T.C.	29.55
3230	B2/III	2	0-34 cm	Sandstone	107. 00
3505	YA2/I	1	10 cm	Shell	1.35
3559	YA2/IV	1	14 cm	Chert	1.45
3654	YF3/I	2	40-44 cm	Jasper	29.55
3672	XA2/II	2	70 cm	Sandstone	24.45
3707	B3/II&IV	1	15 cm	T.C.	35.12
3939	ZF2/I	2	35 cm	Sandstone	51.48

from different levels of excavation. The details are documented in the table below.

Copper Objects: The copper objects recovered from this season's excavation comprises of arrowheads (Pl. 14), bangles (Pl. 15), spearheads, fishhooks, rings, rods, chisels, etc.

Other Objects: Beads of semi-precious stones like lapis lazuli, carnelian, agate, jasper, besides, beads of terracotta, shell and gold were found from different levels. However, etched carnelian beads were found only from the Mature Period (Pl. 16). Bone objects include points and awls (Pl. 13). Stone objects include mullers, pestles, pounders, sling balls and cubical weights.

Palaeo-botanical Objects: A large number of palaeo-botanical samples have been collected from different levels, to ascertain the subsistence pattern of the Harappans. Similarly, a good number of charcoal samples have also

been collected from different stratigraphic levels of the mound, which are now under scientific analytical study.

Medieval Period Coin Hoard: The mound at Bhirrana was in use even after its desertion by the Harappans as is attested to by the presence of large number of burial pits cutting almost all the Harappan structures. A brick kiln on the southeastern part of the mound and a cache of copper coins ascribed to Khalji and Tughluq dynasty were also found outside the southern arm of the fortification wall. As a chance discovery, a hoard consisting two earthen pots containing copper coins including a lone silver coin belonging to the medieval period was also discovered. These coins are being studied for the final report.

There appears to be a lengthy desertion of the Harappan mound, as no subsequent deposit of following periods were noticed. However during the late medieval / modern period, a part of the mound i.e., northeast section was utilised for raising a brick kiln.

Chronology

The carbon samples collected during the field season 2003-04 were sent to the Birbal Sahni Institute of Palaeobotany, Lucknow. The result of which are as follows.

At the outset it is remarked that the sample BRN 2 (BS No. 2327) has given the youngest dates of the recent past, thereby implying that the sample is contaminated. Hence, it cannot be taken into consideration while discussing the chronology of the Harappan civilization at Bhirrana.

With regards to the other samples like BRN 1 (BS No. 2308); BRN 3 (BS No. 2310); BRN 4 (BS No. 2311) and BRN 8 (BS No. 2301), it can be stated that these dates readily agree with the already known chronology of the Harappan Civilization (ranging from Early Harappan to the Late Harappan), i.e. the fag end of the 4th millennium to the middle of the 2nd millennium BC. However, the samples like BRN 5 (BS No. 2318); BRN 6 (BS No. 2333) and BRN 7 (BS No. 2314), have given very early dates ranging from 6647-4353 BC.

An over view of the dates of all the seven samples provide a perceptible consistency in their time-range. Under such circumstances, significance of the early dates of samples like BRN 5,6, and 7 cannot be loss of sight. Therefore, to be on surer grounds, another set of nine samples recovered from the site during the field season 2004-05, have also been sent to Birbal Sahni Institute of Palaeobotany, Lucknow. The results are still awaited.

Table : C^{14} dates from Bhirrana

Sample ID	BS No.	C^{14} Age (Yr. BP)	Cal. Age Range (1 Sigma) Yr. BP	Yr. BC.
BRN 1	2308	3300 ± 200	3826 – 3274	1876 - 1324
BRN 2	2327	40 ± 80	31- 93	Contaminated
BRN 3	2310	3190± 160	3629 – 3214	1697 – 1274
BRN 4	2311	3890 ± 90	4442 – 4153	2492 – 2213
BRN 5	2318	6120 ± 250	7286 – 6671	5336 – 4721
BRN 6	2333	7590 ± 240	8597 – 8171	6647 – 6221
BRN 7	2314	5700± 170	6720 – 6303	4770 – 4353
BRN 8	2301	4050 ± 90	4806 – 4418	2856 – 2468

On the receipt of the second set of C^{14} dates, a comparative analytical study of contextual occurrence of carbon samples vis-à-vis the material remains thereof, shall be taken up so that the implications of these early dates can be appreciated in perspective.

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Stylised Terracotta Animal Head with Horns from Bhirrana – Identification and Significance

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Association of animal horns as one of the cultural traits of the Harappans is best illustrated in the form of horned headgear provided to the central figure of the so-called proto-Shiva or the *Pashupati* seal (Joshi and Parpola 1987) from Mohenjodaro. In addition to this, many more such seals bearing horned deities or semi-divine figurines are reported from various Harappan sites in the Indus-Saraswati valley. Even the paintings on the Early Harappan pottery carry a figure of the horned deity (Lal 1997). It is also opined that a few of the terracotta/steatite human figurines, especially the so-called priest-figure, recovered from excavated sites might have had horned headgear over their heads, but are now missing (Kenoyer 1998).

The excavation of the Harappan mound at Bhirrana (29° 33' N; 75° 33' E) Dist. Fatehabad, Haryana, has yielded, in considerable numbers, not only fragments of terracotta horns but also highly stylised terracotta animal heads with rising incurved horns in complete as well as mutilated conditions (Pl. 1, nos. 6, 8, 9; Fig. 1 & 2).

Table: Details of Animal Horn Depictions in the Terracotta Art at Bhirrana

Reg. No.	Tr./Qdt.	Layer	Depth in cm	Object	Material	Measurement in cm	Remark
2522	ZA2/III	2	35-42	Horn fragment	TC.	H.: 8.3 T.: 3.3	Handmade, red-fired massive fragment of a horn with an intact and bold perforation. Damaged on the front face, two more perforations bored on the lateral side (Pl. 1.7; Fig. 2.13).
2575	A2/I	1	15-40	Horn fragment	TC.	H.: 5.3 T.: 2.2	Well-fired fragment of a horn with a single perforation (Pl. 1.5).
2565	ZA2/IV	2	41-62	Painted animal head with damaged horn	TC.	H.: 4.0 B.: 5.8 T.: 1.4	Handmade, red-fired, broken, stylized animal head with damaged horns. Four perforations including a bold one on snout. It also bears black hand painting (Pl. 1.6, Fig. 1.2).

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2567	ZA2/IV	2	41-62	Horn fragment	TC	H : 3.7 T: 1.7	Handmade, well-fired fragment of a horn, with a partially preserved groove of a damaged perforation.
2612	YA2/III	2	118	Painted animal head with horn	TC	H: 6.5 B: 9.5 T: 1.5	Stylised animal head with incurving horns. Handmade, red-fired, intact. With black- band painted motifs. Six perforations including a bold one on its snout (Pl. 1.9; Fig. 1.3).
				Painted horn fragment	TC	H: 5.1 T: 1.4	Handmade fragment of a horn with three perforations and bands painted in black (Pl. 1.4; Fig.1.4).
2878	ZB2/I	2	80-95	Animal head with missing horns	TC	H: 3.4 B: 5.2 T: 2.0	Hand made, red-fired, stylised animal head, with a bold perforation on the snout portion and two intact perforations.
2915	ZA4/IV	1	10-25	Horn fragment	TC	H: 4.5 T: 1.7	Handmade, red-fired, fragment of a horn with a deep incised groove on the inner face of the horn. Two big perforations, also, two smaller perforations near the damaged tip of the horn (Fig. 2.12).
2923	ZA4/II	1	10-20	Horn fragment	TC	H: 4.2T: 1.5	Handmade, red-fired fragment of a horn with two intact perforations and a groove of a damaged one. Inner face has a pre-firing deep groove (Pl. 1.2; Fig. 2.8).
2961	ZA4/I	1	25-35	Miniature animal head with a horn	TC	H: 1.5 B: 3.6 T: 1.0	Intact, well-fired, highly stylised miniature animal head with incipient horns. Two perforations across the thickness in the centre (Fig. 2.2).
3056	YH7/I	1	10-25	Painted horn fragment	TC	H: 3.6 T: 1.4	Handmade, red-fired horn fragment with chocolate colour painted bands. One intact perforation and a groove of a damaged one (Pl. 1.1; Fig. 1.6).
3066	ZA4/II	1	45-55	Animal head with damaged horn	TC	H: 4.5 B: 6.6 T: 2.4	Handmade, well-fired, damaged stylised animal head with horns. One horn is missing, another is damaged. Three prominent perforations are there. An interesting feature is nostrils in the form of two blind perforations on the lower portion of the snout. Also a couple of blind perforations on the top of the head (Pl. 1.9; Fig. 2.11).
3116	YA4/III	1	0-10	Horn fragment	TC	H: 4.6 T: 2.3	Handmade, red-fired, sturdy fragment of a horn with a prominent perforation and a partially retained groove of a damaged perforation. On the inner face are two grooves (Fig. 2.10).
3231	ZB5/III	1	25-30	Painted animal head with damaged horns	TC	H: 2.7 B: 3.3 T: 1.0	Handmade, red-fired, highly stylized animal head with damaged horns. Eight extant perforations. Marginal ends have faint black painted bands. In between horns, seven black painted lines are visible (Pl. 1.3; Fig. 1.1).
3319	ZD1/I	1	8	Horn Fragment	TC	H: 4.3 T: 3.6	Hand made, well-fired, fragment of a horn with a prominent perforation but partially damaged.
3320	ZD1/I	1	15	Horn fragment	TC	H: 2.8 T: 1.3	Hand made, well-fired, burnished fragment of a horn with three perforations. On the inner face of the horn is a post-firing groove.

3345	YE2/II	2	10-29	Damaged animal head with horn	TC.	H.: 3.3 B.: 6.2 T.: 1.1	Handmade, red-fired, flattish fragment of a stylized animal head with four perforations, including a bigger one on the snout. Partially retained grooves of perforation on damaged horns (Fig. 2.6)
3514	YE2/IV	2	20-25	Horn fragment	TC.	H.: 6.1T.: 1.9	Handmade, red-fired fragment of a horn with two perforations. A groove of another perforation is visible.
3530	AJ/IV	1	75	Horn fragment	TC.	H.: 3.5T.: 1.3	Handmade, red-fired horn with a perforation (Fig. 2.5)
3557	ZF5/IV	1	0-10	Damaged animal head with horn	TC.	H.: 3.9 B.: 5.2 T.: 1.6	Handmade, red-fired damaged animal head with horns. Half of the object is missing. The extant portion has a partially damaged, bold perforation on the snout and an intact perforation (Fig. 1.5).
3766	XA/II	2	47-54	Horn fragment	TC.	H.: 3.9 T.: 1.9	Handmade, red-fired fragment of a horn with two perforations.
3855	YH6/III	2	60-65	Horn fragment	TC.	H.: 5.8T.: 2.2	Handmade, red-fired fragment of a horn with an intact perforation, another being blind.
3903	YA4/II	2	78	Animal head with horn	TC.	H.: 3.5 B.: 7.2 T.: 2.3	Handmade, red-fired, sturdy and highly stylized intact animal head without uprising horns. A bold perforation on the snoot, along with a prominent perforation on either side of the terminal ends of the forehead. There are also four more miniature perforations on the extreme side of the head portion (Fig. 2.1).
4049	ZD11/I	DP9	23	Horn fragment	TC.	H.: 5.5 T.: 1.6	Handmade fragment of a horn, made on finely burnished grey ware, with an intact perforation and two partially preserved grooves of damaged perforations. There is also a post-firing deep groove on the inner face of the horn (Fig. 2.14).
4062	ZD11/I	DP9	47	Animal head with missing horns	TC.	H.: 3.4 B.: 3.8 T.: 1.6	Handmade, red-fired fragment of stylized animal head with a bold perforation on the snout and a miniature perforation above it. Horns are missing (Fig. 2.7).
4076	ZD11/I	DP9	60	Horn fragment	TC.	H.: 5.7 T.: 1.9	Handmade, red-fired fragment of a horn with two intact bold perforations and a groove of a damaged one. Tip of the incurving horn is also damaged from the inside.

All these animal heads, with rising incurved horns, are handmade and belong to the Mature Harappan Period. In these examples, the head or snout portion is represented by a rectangular projection with faint concave sides at the bottom, upon which along the marginal sides of the broad forehead, rise incurving horns with rectangular cross-sections. But in some cases, there are no rising horns, but abrupt terminal ends on the sides (Fig. 2.1 & 2). A few of these objects bear cross bands, at regular intervals, painted in black/chocolate colour (Fig 1.1 to 1.6) and in some cases, these bands are painted all around the horns. Another interesting feature of all these objects that attracts immediate attention is the presence of a bold perforation on the snout portion and varying number of perforations of different dimensions provided in horizontal alignment over the forehead and further extended on to the horns. These perforations were bored when the clay was in leather-hard condition. A few of these horns have both pre-firing and post-firing, both deep and shallow, grooves cut on the inner face of the horns. A most interesting feature, that has lent

an element of realism to one such highly stylised object, is the presence of two blind perforations as nostrils with a dividing shallow depression in between, on the lower part of the snout (Fig. No. 2.11). This indeed is a close imitation of the upper lip of cattle.

At this juncture, it is of immense interest to refer to identical objects, though only in mutilated conditions, reported from the Late Harappan sites in the Cholistan region by Mughal, who termed them as "Crescent-shaped pendants of pottery with perforation." He also refers to an unpublished report on Ghaggar-Hakra (1943) by Aurel Stein who has called such objects as "hangers." Further, Mughal informs, "One complete specimen from Harappa, not illustrated by Vats, is preserved in the National Museum of Pakistan, Karachi under accession no. 54, 3870/12887. It has six perforations" (Mughal 1997). However, it may be remarked that in case of the photo illustrations of Mughal under reference, the objects from Cholistan are put upside down to look like a "pendent." Since such objects were already termed as "hangers" by Stein in the past, Mughal appears to have followed the clue and settled down to the term "Crescent-shaped pendants." Hence, the upside down placement in the photographs.

A Harappan site at Baror in Hanumangarh District, Rajasthan, recently excavated by the Archaeological Survey of India in the years 2003-04 and 2004-05, has also yielded similar terracotta objects, but the excavators have preferred to call them as toy-cart frames.

Identification

Having identified these terracotta objects as stylised animal heads with horns, the question now would be, with which animal such horns could be associated?. To begin with, these heads are certainly not those of bull or cow, since their horns (in reality) are circular in cross-section. It is needless to state that the Harappan craftsmen have carefully adhered to the principles of realism while carving the anatomical details of animals on their seals. As a testimony to these principles, the horns of *Brahmani* bull and short horned bulls are invariably shown as circular in cross-section and without any segmentation. Even their terracotta counter parts have horns with circular cross-sections. It is also important to note that in the present collection, none of these stylised specimens have horns with circular cross-section, but, instead, are rectangular.

Further, as already stated above, a few stylised animal heads with rectangular horns bear cross bands painted in black or chocolate colours. These bands, instead of being just decorative motifs, are, in fact, symbolic and suggestive in nature. At this juncture, it is of interest to note here that the Harappan craftsmen have invariably used incised lines to imply the growth lines of horns of buffalos carved in their seals. Further, we may recall that such incised horn-headgear adores the so-called *Pashupati* or Proto-Shiva or similar figures carved on the seals. At the same time, it may be noted that there is no dearth of un-incised horned divine figures of both seated and standing postures on the seals (Mustafa Shah and Parpola 1991). Therefore, in the light of the adduced evidences, it is not far fetched to believe that the black bands on these terracotta objects do represent the highly stylised growth lines of buffalo horns rather than being mere decorative motifs.

Significance

The conceptualisation of abstract concepts of any given religion is physically manifested in the day-to-day usable and portable objects. Such objects are purely symbolic in nature and are used in various ritualistic observations. Efforts are underway, among scholars of Harappan studies, to extract as much information as possible related to the religious and ritualistic aspects, by pursuing interpretative study of portable antiquities and structural remains recovered so far from various excavations. As a sequel, horn appendices as headgear to the human figures, on many seals, were useful to identify them as deities or shamans. But, now, here are some stylised terracotta objects, which stand as symbolic representations of horned headgear, and form a class of their own. If we are to concede that the use of horned headgear stood for certain ritualistic aspects of the religion prevalent in the contemporary society, then the discovery of present stylised

terracotta animal heads with black painted bands as growth lines of buffalo horn, certainly is a direct evidence of ritualistic practices followed by the Harappans. It may be opined that such horn-heads might have been used by the priestly class or the people who were really engaged in performing rituals by way of tying them on their heads or foreheads. A number of holes on the body of these objects also stand for their functional utility i.e. for decorating them with tassels of feather or some such material and also to insert a fillet or headband for fastening around the head of an individual.

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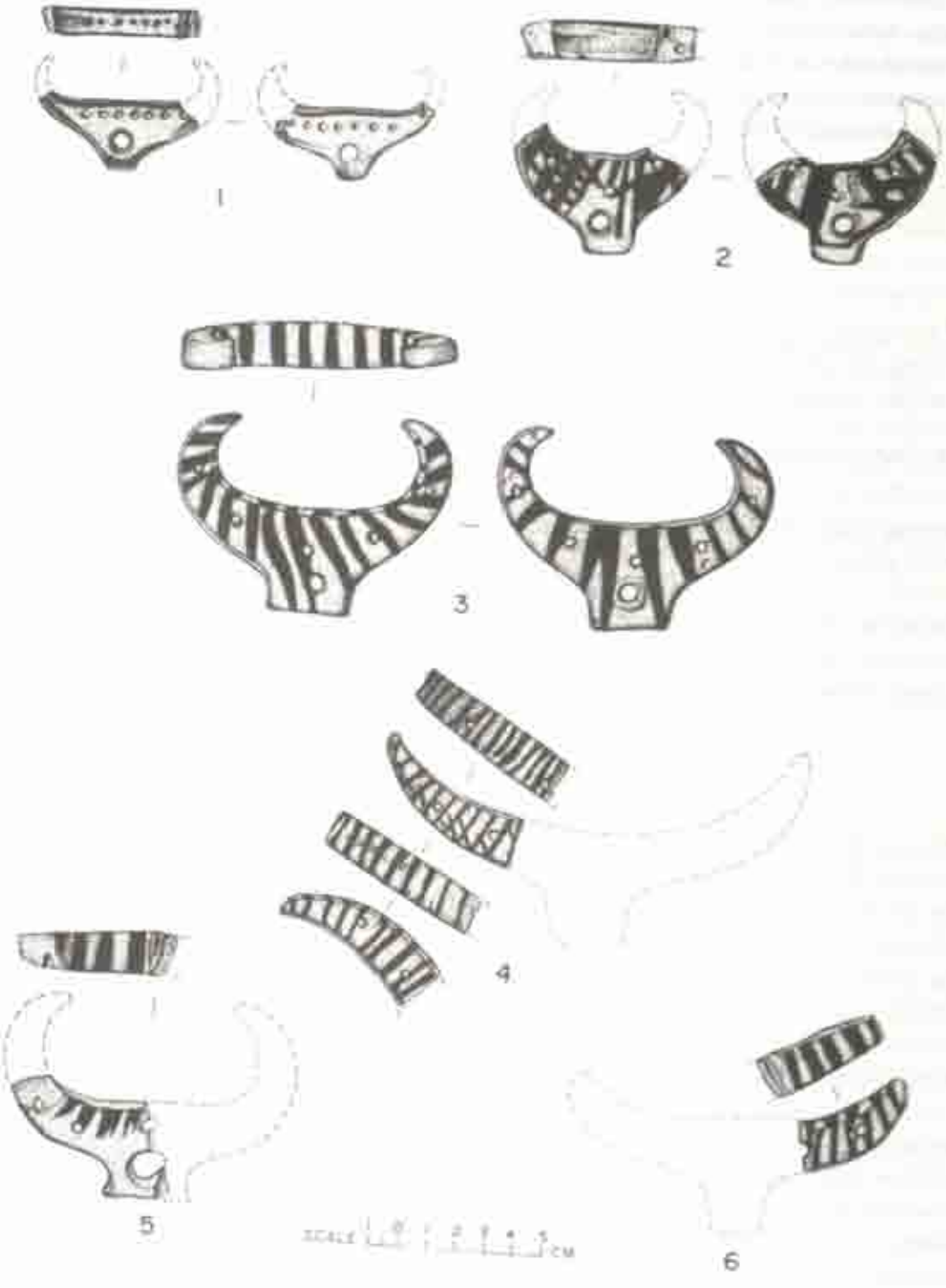


Fig. 1 : Bhirrana : Stylised painted terracotta animal head with horns and fragments. (Courtesy: ASI)

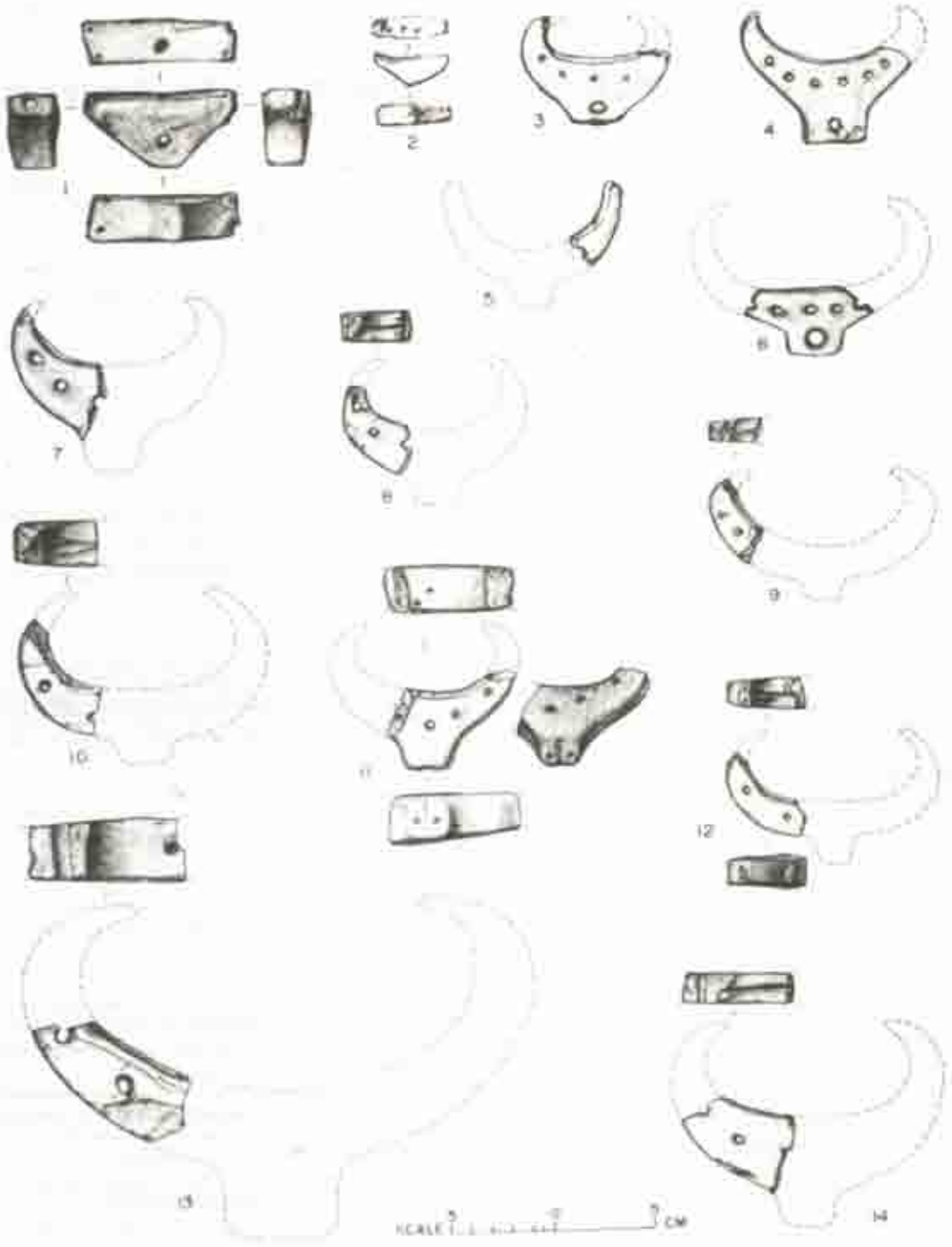


Fig. 2 : Bhirrana : Stylised pair terracotta animal head with horns and fragments. (Courtesy: ASI)

Dholavira's Geometry:A Preliminary Study

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Background

Discovered in the 1960s by Jagat Pati Joshi and excavated in the 1990s under the direction of R.S. Bisht, Dholavira (in Kachchh district of Gujarat) is by any standard a spectacular Harappan city: monumental architecture, massive fortifications, the use of dressed stones, and elaborate water management are some of its hallmarks. However, the one feature that leaps off its map (Fig. 1) is its highly geometric planning, involving multiple enclosures (citadel, middle and lower towns) laid out with what appears to be deliberately chosen proportions.

In several papers, R.S. Bisht[1] has described this Harappan city in some detail and highlighted a few of those proportions. To quote his chief findings (reformulated here following the system of notation spelt out in Table 1):

Table 1 : Reformulated city details of Dholavira

Abbreviation	Meaning	Actual measurement (in metres)	Mnemonic clue
L_t	Length of city	771.1	Subscript 't' stands for 'town'
W_t	Width of city	616.85	
L_m	Length of middle town	340.5	Subscript 'm' stands for 'middle town'
W_m	Width of middle town	290.45	
L_{ci}	Inner length of castle	114	Subscript 'ci' stands for 'castle inner'
W_{ci}	Inner width of castle	92	
L_{co}	Outer length of castle	151	Subscript 'co' stands for 'castle outer'
W_{co}	Outer width of castle	118	

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A. The city's length (east-west axis) and width (north-south) are precisely in a ratio of 5:4 ($L_t/W_t = 5/4$);

B. the middle town's length and breadth are in a ratio of 7:6 ($L_m/W_m = 7/6$) including the ceremonial ground, or 7:5 excluding it; this naturally implies that the ground's proportions are 6:1;

C. the castle's proportions[2] follow the city's ratio of 5:4 ($L_o/W_o = 5/4$);

D. the castle's outer length is one fifth of the city's length, while the castle's inner length is one seventh of it ($L_o/L_t = 1/5$, $L_i/L_t = 1/7$);

E. the castle's north-western corner is aligned with the city's main NE-SW diagonal; so too, the castle's north-eastern corner is aligned with the city's as well as the middle town's north-western corners;

F. the citadel (castle and bailey together) has a ratio of 1:2.

Clearly, such proportions can only be the result of a deliberate planning. Having said that, we are faced with two major questions: (1) Since one proportion may just be the logical consequence of another, what were the initial principles that Dholavira's architects decided to adopt? In mathematical terms, what are the basic assumptions — or axioms — we need in order to work out the totality of Dholavira's geometry? (2) Can we attempt to guess some reasons for such initial choices, significances behind adopted proportions, and do we find such proportions used in other cities or reflected in other aspects of Indian civilization?

Before we proceed, we should mention Bisht's estimate of a maximum error margin of 0.5% on measurements, more likely "on the higher side," and add that whatever precise ratios the Harappans may have decided on, irregularities on the terrain (its gradients as well as the two now seasonal rivers in the north-west and south-east) and alterations over the centuries certainly introduced small deviations from the 'ideal' proportions. If we find specific ratios to fit actual measurements (either provided above by Bisht or read on Dholavira's map) within 1% or 2%, it will be legitimate to consider them as potential deliberate choices. Let us now adopt the following additional definitions (Table 2 below, to be studied in conjunction with Fig. 2):

Table 2

Abbreviation	Meaning
F	The castle's outer north-western corner, a major 'focus' of the city
A	Distance from the city's northern wall to F
B	Distance from F to the city's southern wall
C	Distance from the city's western wall to F
D	Distance from F to the city's eastern wall
P	Distance from the city's western wall to the middle town's western wall
Q	Distance from the city's northern wall to the middle town's northern wall
L_{wi}	Western portion of L_w up to F
L_{ei}	Eastern portion of L_w from F
K	Width of the castle's western and eastern fortification
R	Ratio of 5/4 or 1.25

Basic Choices for Dholavira's Geometry

After studying Dholavira's geometry both empirically and mathematically, certain conclusions can be reached regarding its fundamental principles (which are not all identical with those outlined above by Bisht). We should however keep in mind that the city in its "classical" form shown in Fig. 1 did not appear overnight, it evolved from earlier stages through several alterations and expansions (detailed in Bisht's papers). For instance, the dimensions of the castle, the earliest part of the city, were altered when the middle town was added, so as to bring them in line with the desired proportions: it was a back-and-forth process. Therefore, more than the precise sequence proposed below, it is the choices and their consequences that matter.

1. The architects, as pointed out by Bisht, decided to have the city's as well as the castle's lengths and widths in a ratio of 5:4 ($\mathbf{L_t/W_t = L_{ct}/W_{ct} = 5/4}$). What is so special about the ratio $r = 5/4$ (= 1.25), we will probe later. (Of course, the length of the city was dictated by the actual topography, and clearly by the space available between the two rivers enfolding it, which were crucial to Dholavira's water management.)

2. Then they had to choose the castle's location; to that end, they saw its outer north-western corner (F) as a focal point, probably because it would overlook the ceremonial ground below not far from the latter's centre. To maintain the ratio r as far as possible, the natural way was to keep F on the city's NE-SW diagonal, since all points located along this diagonal would exhibit the same ratio r between their distances to the city's northern and eastern boundaries. This can be expressed algebraically by $\mathbf{D=rA}$ (D is five fourths of A) or again $\mathbf{C=rB}$. (The actual ratios, measured from the published map of the city, are 1.23, within 1.6% of the ideal ratio of 1.25).

3. F's precise location on this diagonal now needed to be determined. This amounts to choosing a fixed ratio between A and B or C and D, or again between A and C or B and D (any one of those four choices would be enough to fix F). Measurements taken on the map show that A is very precisely 1.5 times C: $\mathbf{A/C=3/2}$ must have been the architects' choice in choosing F's location. (Note that 3/2 can also be expressed as $r+1/4$.)

4. Now they had to choose the actual dimensions of the castle (or, again, alter the older ones). But if we look for simple ratios, we find that they first decided on the middle town's dimensions, for its length is very nearly 4/9 of that of the town (the error margin is only 0.6%): $\mathbf{L_{mt}/L_t = 4/9}$. (Note that $9/4 = r+1$.) As pointed out by Bisht, they also chose for the middle town a width equal to six seventh of the length: $\mathbf{L_{mt}/L_t = 7/6}$. We will see later a possible reason for this choice.

5. We now find that the architects chose to have an internal length for the castle equal to precisely one third of the middle town's length (the error margin a mere 0.4%): $\mathbf{L_{ct}/L_{mt} = 1/3}$.

6. The middle town's dimensions now fixed, its precise position within the city had to be set. The decision seems to have involved a choice to have the middle town's north-west corner equidistant from the city's northern and western boundaries: $\mathbf{P=Q}$. This is precisely the case as far as the map shows (and is also pointed out by Bisht).

7. Returning to the castle, with an error margin less than 0.7%, we find its inner length to be precisely three quarters of its outer length: $\mathbf{L_{ci}/L_{ce} = 3/4}$. The width of the eastern and western fortification walls, K (half of $L_{ce} - L_{ci}$), being irregular, Bisht takes care to note that the dimensions for L_{ci} and W_{ci} are averages; nevertheless, this ratio is unlikely to be due to chance; it can moreover be expressed as $r-1/2$. (Note that Bisht's proposed $L_{ce}/L_t = 1/5$ and $L_{ci}/L_t = 1/7$ result in $L_{ci}/L_{ce} = 5/7$; but taking his measurements of 114 and 151 m respectively for L_{ci} and L_{ce}, the error margin for 5/7 is over 5%, which is hardly acceptable over such a small distance; however, with our proposed

ratio of 3/4 the error margin is below 0.7%, a more satisfying result.)

8. Finally, the architects chose the proportions indicated by Bisht for the bailey and the ceremonial ground (1:6 for the latter).

Calculations

With these 'raw data' in hand, we can now indulge in calculations. However, we must stress that the Harappans certainly knew no algebra, only some geometry (how much is more than we can say at this stage): indeed all the above ratios can be easily applied to the ground with nothing more than a rope and a few sticks. Our calculations are only intended to bring out a few other underlying features of Dholavira's geometry. (We do not explain them in detail as they require only the most basic knowledge of algebra and are entirely based on the first seven principles outlined above; results have often been expressed in terms of L_1 as a convenient reference.)

General Proportions

G. $A/L_1 = 12/23$; $C/L_1 = 8/23$; $D/L_1 = 15/23$. We therefore have $A/W_1 = 15/23$ which is within 2.2% of 2/3, a proportion that may have tickled the architects' hunger for perfect ratios, especially as it applies to the location of F, thus nearly two thirds down the width of the city, also two thirds down its length (since D/L_1 has the same value).

H. $A/B = D/C = 15/8$. (Note that 15/8 can be written as $3\tau/2$.)

Middle Town

I. $L_{m1}/L_{m2} = 75/86$, a ratio very close (by 0.3%) to 7/8.

J. $P/L_1 = Q/L_1 = 68/483$. A fair approximation (within 1.5%) of this fraction is 1/7.

Castle

K. $L_{c2}/L_1 = 4/27$. This is just 0.2% away from the ratio supplied by the actual dimensions, an excellent agreement (far closer than Bisht's $L_{c2}/L_1 = 1/7$, which is 3.4% off)'. (Note that the inverse ratio, 27/4, is $5\tau + 1/2$).

L. $L_{c1}/L_1 = 16/81$, verified within 0.9%; Bisht's proposed $L_{c1}/L_1 = 1/5$ is 2.1% off, although this is an acceptable approximation and a ratio that might indeed have appealed to the architects.

M. $K = L_{c1}/8 = L_{c2}/6$. These are attractive proportions, the latter yielding K=19 m (again, the castle's fortification wall being irregular in width, this should only be taken as an ideal average).

The Question of Units

Clearly Dholavira's engineers must have used some unit of length to measure or calculate the various dimensions involved. It is tempting to try and correlate those dimensions with one of the three known Harappan scales, that of nearby Lothal suggesting itself as the more appropriate candidate. Its basic unit being 1.77 mm (as 27 dividing lines, or 26 divisions, cover 46 mm on Lothal's ivory scale), we find that the castle's inner width ($W_{c1} = 92$ m) is precisely 52,000 times this unit: the error margin, 0.04%, is remarkably small. The castle's ideal length ($L_{c1} = 5W_{c1}/4$) would then be 65,000 units (i.e. 115 m, or 1 m more than Bisht's 'average length'), while the ideal width of the castle's fortification wall (east and west), $K = L_{c1}/6$, would be 10,833 units, just 0.3% off the sacred number of 10800.

Whether this is a mere coincidence is more than we can say at the moment, but it does seem likely that the Lothal unit, or a unit closely related to it, may have been used as a standard to work out the castle's and therefore the rest of Dholavira's dimensions.

Other Cities

Another natural question is whether some of Dholavira's proportions are reflected in other fortified Harappan cities and towns. Here we should point out that the accurate data required to answer this question (precise measurements or good maps) are not easily available; indeed from one publication to another we often find substantial differences for the same dimensions. The following observations are therefore no more than a brief random sampling, subject to correction and intended to stress the need for a thorough study:

N. The ratio 1:2 for Dholavira's citadel, is common enough: we find it in the citadels of Mohenjo-daro (roughly 380 x 190 m)[4], Harappa (415 x 195m)[5] and Kalibangan (240 x 120 m)[6] — it is rather striking that this ratio should be common to at least four major citadels. In addition, it is found in Surkotada's overall dimensions (130 x 65 m)[7].

O. The ratio 1:3 for Dholavira between L_2 and L_{c2} is used in Mohenjo-daro's so-called 'college' (69 x 23.4 m)[8].

P. The ratio 1:6, used for Dholavira's ceremonial ground, is reflected in Lothal's docking yard (average dimensions 216.6 x 36.6m)[9].

Q. Finally, Dholavira's prime ratio, 5:4, is the same as Lothal's overall dimensions (280 x 225 m)[10], an important observation in view of Lothal's relative proximity. But we also find it further afield, for instance in Harappa's so-called "granary" (50 x 40 m)[11].

Dholavira's Ratios: A Case for Continuity

The basic ratios adopted in Dholavira's plan, $r = 5/4$ or 1.25 (for the castle, the town, and a few other internal proportions) and 7/6 (for the middle town), must have held a special significance in the Harappan mind, most likely an auspicious one. Indeed, it is quite remarkable that these same ratios are commonly prescribed as auspicious proportions for houses in various traditions of *Vastu Shilpa*.

Varahamihira, for instance, writes in chapter 53 of his *Brihat Samhita*: "The length of a king's palace is greater than the breadth by a quarter. The length of the house of a commander-in-chief exceeds the width by a sixth."[12] These two ratios (1 + 1/4 and 1 + 1/6) are better expressed as 5/4 and 7/6 — very precisely Dholavira's basic proportions! This seems too much of a coincidence: while *Vastu Shastra* as codified in Varahamihira's time (or possibly earlier) was clearly not in existence during the Mature Harappan phase, it is wholly possible that specific proportions regarded as auspicious in Harappan times were carefully preserved and later integrated in a systematic approach to architecture.

It may be objected that Dholavira's architects preceded Varahamihira by some three millennia; if a tradition of auspicious ratios was thus preserved, should we not have some trace of it in between? Indeed we do: the *Shulba Sutras* provide one such missing link. For instance, Baudhayana's *Shulba Sutra* (4.3) lists detailed dimensions for the trapezium-shaped sacrificial ground (*mahavedi*), where the sacred fire altars are to be arranged; its longer (western) side must measure 30 *prakramas* (a unit roughly equal to 54 cm) while its shorter (eastern) side will be 24 *prakramas* — exactly our ratio r=5/4. We find r again embedded in Baudhayana's system of units (spelt out in 1.3): for instance it is the ratio between the *pada* (= 15 *angulas*) and the *pradesha* (= 12 *angulas*), and between the *purusa* (5 *aratnis*) and the *vyayama* (4 *aratnis*). More research is likely to bring out similar examples from the Brahmanas and the Puranas. In the meantime, is it not fascinating that proportions deliberately adopted at Dholavira and Lothal should have such a central importance in the *Shulba Sutras* as well as *Vastu Vidya*?

In itself, the preservation of ratios and units right from Harappan times is nothing to be surprised at; it has long been noted that Harappan units of lengths and weights resurfaced in historical times, and there has been a steadily mounting body of evidence[13] of Harappan techniques, crafts, ornaments, art forms, customs, rituals and religious beliefs being transmitted virtually unchanged down the ages. It will take systematic research to bring out such a

transmission in the fields of town planning and geometry. Let us venture to advance that the findings will very likely uphold Jim Shaffer's thesis of a strong connection between Harappan urbanism and the urbanism of later historical times, which he finds connected by "a unique cultural tradition traceable for millennia."[14]

Postscript

Just as this article became ready for press, I happened to notice two more correlations between Dholavira's geometry and later traditions, the second of which may prove to be specially important. These are briefly stated in this note.

The first point is that the proportions mentioned in the *Shulba Sutras* for the *mahavedi* (the main sacrificial ground) appear earlier in the *Shatapatha Brahmana* (1.1.2.23, quoted in *The Sulbasutras*, ed. S.N. Sen & A.K. Bag, New Delhi: Indian National Science Academy, 1983, p. 170); in this ancient text, instead of specific units as in the *Shulba Sutras*, steps are used: the vedi's western side is 30 steps long, while the eastern side is 24 steps. The result is however the same in terms of proportions — 5:4, our Dholavira ratio. This is one more link in the long transmission from Dholavira's architects to the codifiers of *Vastu Shastra*, but also one more connection between the Harappan and the Vedic worlds.

The second observation concerns the actual unit of length that Dholavira's planners may have used. I already pointed out that the castle's inner width seems to be related to Lothal's unit of 1.77 mm, as does the average breadth of the castle's eastern and western fortification walls, K (about 10800 times 1.77 mm). One system of units described in Kautilya's Arthashastra (usually dated 4th c. BC) seems to fit very well in the Dholavirian scheme. In a section on measures of space and time (2.20.19, see R.P. Kangle's translation, New Delhi: Motilal Banarsidass, 1986, part II, p. 139), we are told that "108 *angulas* make a *dhanus*, measure for roads and city-walls...." The actual measure of an *angula*, related to the width of a finger, has probably varied in time and space, as have most other units; common estimates include 17.78 mm (V.B. Mainkar, Metrology in the Indus Civilization, in *Frontiers of the Indus Civilization*, eds. B. B. Lal & S. P. Gupta, New Delhi: Books and Books, 1984, p. 147) and three-fourths of an inch or 19 mm (J.R. Fleet), among others. Mainkar's value is obviously of interest to us, since it is very nearly 10 Lothal units, and we know that Harappans commonly used multiples of ten. Let us therefore assume a '*Harappan angula*' of exactly 17.7 mm and see whether it makes any sense in Dholavira's actual geometry.

With such a value, a *dhanus* or 108 *angulas* as defined by Kautilya would be about 1.91 m. Since we have noted that K is close to 10800 Lothal units, this leads to K = 1080 *angulas* = 10 *dhanus*. This certainly looks like a convenient number, all the more striking as Kautilya states that the *dhanus* is to be used as a "measure for roads and city-walls." In a confirmation that this is not just wishful thinking or a happy coincidence, we find that we can easily express the city's other main dimensions in terms of the *dhanus*: following our earlier formulas, the castle's inner length (Lci/K = 6) becomes 60 *dhanus* (just like the southern side of Lothal's 'acropolis,' incidentally) while its inner width is 48 *dhanus*; the castle's outer length (Lco/K = 8) and width become 80 and 64 *dhanus* respectively; the middle town's length (Lm = 3 Lci) is now 180 *dhanus*, while the city's overall length (Lt/Lm = 9/4) and width are 405 and 324 *dhanus*. All these numbers are within 1% of actual figures.

Such a system, based on a 'master unit,' equal to 108 times the basic Lothal unit multiplied by 10, appears to be the key to Dholavira's metrology, and clearly survived the collapse of Harappan urbanism, probably because such units remained in use for sacred or ritual purposes (such as fire altars). Further, verifications with dimensions of streets, large buildings etc. are certainly called for (keeping in mind however that different units can be used for different purposes), as is a systematic study of dimensions and proportions in major towns and cities of the Indus-Sarasvati civilization, and their transmission to the historical period.

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The last two papers delve more particularly on Dholavira's geometry.

2. I do not discuss here the appropriateness of terms such as "citadel," "castle," etc. Very likely, the actual purposes of those parts of the city were different from what the terms imply.

3. Incidentally, Bisht (1999: 25) proposes that the total area of the town is 49 times that of the castle; this appears to be a calculation error. Our formulas lead to a precise ratio of 729/16 (the square of 27/4). This is about 45.56, which is rather different from 49. Verifying with actual measurements provided by Bisht (which lead to a city area of 45.57 ha and a castle area of 1.05 ha), we get a ratio 45.35, less than 0.5% off our theoretical value.

4. Lal, B.B. 1997. *The Earliest Civilization of South Asia*. Pp. 106. New Delhi: Aryan Books International.

5. Ibid., p. 112.

6. Ibid., p. 122.

7. Ibid., p. 135.

8. Ibid., p. 108.

9. My calculations of those average dimensions are based on: Rao, S.R. 1979. *Lothal, a Harappan Port*. Pp. 123. New Delhi: Archaeological Survey of India.

10. Lal 1997 (op. cit.): 129.

11. Kenoyer, Jonathan Mark. 1998. *Ancient Cities of the Indus Valley Civilization*. Pp. 64. Karachi & Islamabad: Oxford University Press & American Institute of Pakistan Studies.

12. Bhat, M. Ramchandra (tr.). 1981. *Varahamihira's Brihat Samhita* Vol. 1. Pp. 451-52. New Delhi: Motilal Banarsidas.

13. See for instance: Kenoyer 1998 (op. cit.);

Lal, B.B. 2002. *The Saraswati Flows On: The Continuity of Indian Culture*. New Delhi: Aryan Books International;

Danino, Michel. 2003. The Harappan Heritage and the Aryan Problem. *Man and Environment*. XXVIII (1): 21-32.

14. Shaffer, Jim G. 1993. Reurbanization: The Eastern Punjab and Beyond. In *Urban Form and Meaning in South Asia, the Shaping of Cities from Prehistoric to Precolonial Times* (Eds. H. Spodek and D.M. Srinivasan). Pp. 54. Washington D.C.: National Gallery of Art & University Press of New England.

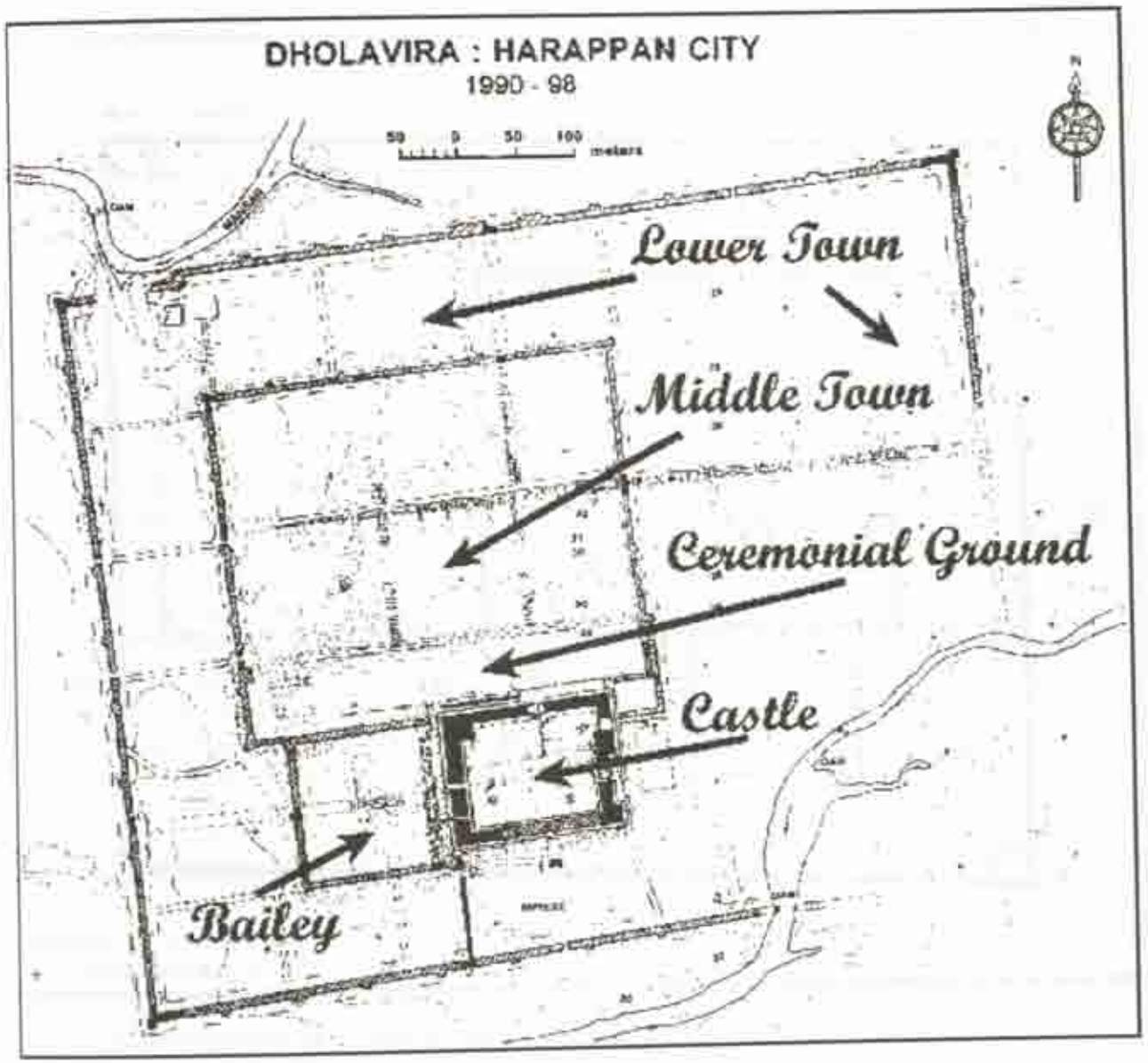


Fig. 1 : General map of Dholavira (adapted from R.S. Bisht 1999)

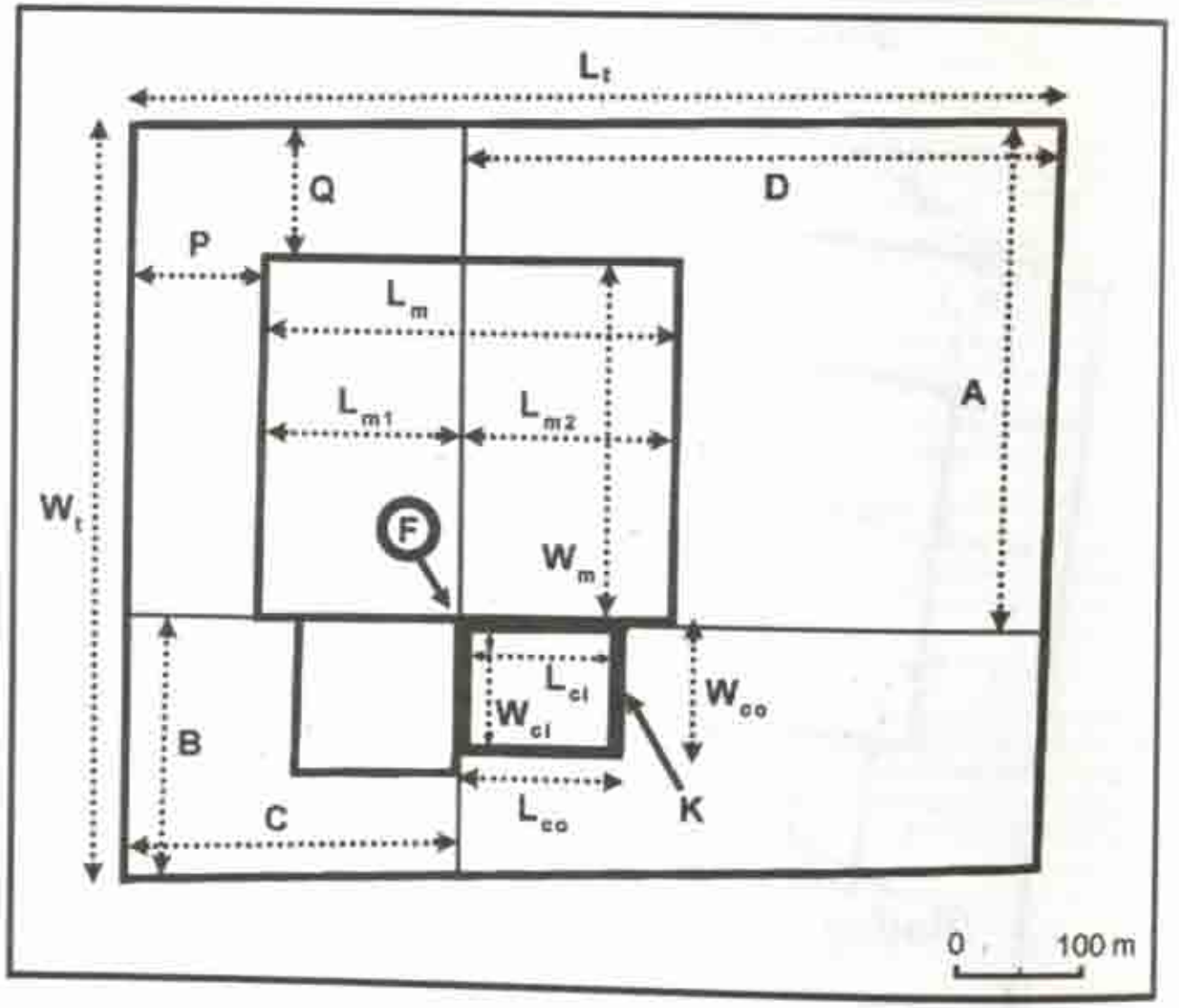


Fig. 2 : Simplified plan of Dholavira, with definitions

Chronological Assessment of the Bara Culture

K.C. Nauriyal*

Nearly five decades ago in the year 1955, when Y.D. Sharma discovered Bara Culture in the upper Sutlej river valley, a new chapter was opened in the field of Harappan Civilization studies (Sharma 1955-56: 121-29; 1976: 5-15; 1980; 1982a: 141-65; 1982b: 32-37; 1983; 1987: 157-76; 1989: 49-52, 237-38, 377-81). The discovery was made in the wake of excavations at Ropar, another Harappan site in the same river valley where the Harappan remnants were noted lying beneath those of the Painted Grey Ware cultures, and a clear cultural hiatus was observed between the two at this site. Discovery of Bara Culture was significant on two counts: (1) little was known about the nature and extent of the late Harappan culture on the east of Indus, and (2) the problem of 'Dark Age' in Indian Protohistory spanning the second-first millennium BC, was an academic challenge to both the historians and the archaeologists. Finding of this new cultural relics in the context of Indian Protohistory was in some good measure a solution to these academic dilemmas.

The discovery posed a new problem of Bara Culture affiliation, however. Opposite stance with regard to the origins of the Bara Culture was entertained by the excavator himself. Earlier, it was propounded that the Bara Culture had generic relationship with the pre-Harappan culture (Kalibangan I, or Early Harappan as it has been termed now), and that it was the rural facet of the urbanized Harappans. Later, the stand was shifted in favour of the linear cultural progression maintaining that all the three cultures – pre-Haruppan, Harappan and the Bara – ran straight down the timeline, the latter stage resulting from the former stage. This view found support of other scholars (Dikshit 1984: 267).

Keeping in mind these diametrically opposite situations, we endeavored to synthesize the available archaeological data having bearing on the chronology of the Bara Culture. It will not be out of place to mention that the material taken up for chronological assessment is confusing in that the absolute chronology based on C^{14} dating of all the Bara Culture sites discovered are not available. So, our study rests on the relative stratigraphy of the findings associated with the Bara culture vis-à-vis Pre/Early, Mature, and Late/Post Harappan culture of the relevant geographic area, which is helpful in chronological assessment. In the discussion that follows, we have elaborated this point to ascertain the working hypothesis concerning the chronological position of Bara Culture.

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While discussing the point, the background of the chronological estimate of all the Bara sites that contributed in one way or the other to an overall make up of the Bara Culture is taken into account so that a broader time-frame of this culture may be projected.

For the sake of convenient discussion, the Bara culture sites have been classified into the following four categories.

A) Sites where Bara culture elements overly the deposits of the Mature Harappan culture.

B) Sites which begin with the Bara culture elements.

C) Sites where Bara culture elements overlap with the other Chalcolithic/Post Harappan cultures.

D) Single-culture site(s) having purely Bara culture.

Our above categorization of Bara sites shows that the Harappa Culture is the central point of reference so far as the relative stratigraphy-cum-chronology of the Bara Culture is concerned. Therefore, in order to reach logical conclusions, we will make a brief note on the sequential/ stratigraphic horizons of the Harappa Culture as it existed in the geographical region associated with the Bara Culture.

The Bhagwanpura excavation in the mid of seventies by Jagat Pati Joshi was a landmark contribution, which brought to light a hitherto unknown phase of cultural continuity, linking Harappa Culture with the later Chalcolithic cultures (IAR 1975-76: 16-17; Joshi 1993; 1989: 64; Lal 1982a: 335-338). The cultural deposit at Bhagwanpura is divided in two Sub periods: IA and IB. While Sub-period IA is designated as late Harappan, Subperiod IB demonstrated continuity of it with the Painted Grey Ware culture for the first time, thus bridging the cultural gap that existed until now between the two cultures. This continuity was noticeable especially in the ceramic assemblage, showing "composite character" (Joshi 1993: 17-23), both in fabric and range, which, according to the excavator, is divided into the following six different categories.

(i) Red ware, both plain and painted, of the late Harappan type, which is in majority.

(ii) Ochre colour ware available from the flood-hit areas.

(iii) Some Cemetery 'H' type shapes.

(iv) Incised ware showing a variety of designs, some with pre-Harappan lineage.

(v) Thick grey ware that is usually found associated with the Harappan and late Harappan ware.

(vi) Pottery of Bara type, which is plain, painted, and incised.

About the pottery assemblages mentioned above, Joshi remarks that the shapes are comparable to those of the late Harappan ceramic assemblage available at Bara, Bahadurabad, Afranjikhera, Siswal IIB, Mitathal IIB, Daulatpur and Raja Karan-ka-Qila, etc. From Bhagwanpura, no carbon date is available. The excavator, however, sent 18 samples from the site for scientific dating by thermoluminescence (TL) method (Joshi 1993: 185-204). Dr. K.S.V. Nambi and his associates at the Health Physics Division of Bhaba Atomic Research Centre (BARC) analyzed these samples. While six samples were rejected, the remaining ones gave the date solution (ibid; for individual sample code and their TL dates see p. 201 of the report). Based on these TL dates, the excavator arrived at the following date-brackets (ibid: 25):

Subperiod IA - circa from 1700 to 1300 BC (or even later)

Subperiod IB - circa from 1400 to 1000 BC (or even earlier)

Since Bhagwanpura has been subjected to horizontal excavations on modern archaeo-scientific lines (IAR 1975-76: 16-17; Joshi 1993; 1989: 64; Lal 1982a: 335-338), and the material remains unearthed from this site are systematically examined and stratigraphically compared,

it can serve as an index to reconstruct the chronological order of the Bara culture. Inasmuch as Sharma has observed that an overlap of the Bara and the Painted Grey Ware Cultures has been confirmed by Jagat Pati Joshi at Bhagwanpura on the bank of Sarasvati in Haryana (Sharma 1982: 158), and that there is continuation of ceramic traditions of the late Harappan from first Subperiod to the second despite a devastating flood at the site. The continuation has, however, witnessed a 'slow and gradual' decline of the pottery of late Harappans by the excavator (Joshi 1993: 18). Chronologically, the Bara culture may thus be bracketed sometime between circa 1700 and 1000 BC at Bhagwanpura.

Applying this knowledge to the material remains related to the Bara Culture, let us examine the chronological issue of Bara Culture in wider perspective especially with reference to the relative stratigraphy of the above-mentioned four categories of Bara related type sites. We begin our survey with the 'A' category sites.

A. Sites where Bara culture elements overly the deposits of the Mature Harappan culture

The principal type-sites where Bara culture overlies the deposits of the Mature Harappan culture, as identified by the respective excavators and other scholars, included here are from 1 to 8 as given below. The latest dates as suggested by respective excavators of the site and fellow scholars are indicated against each site's name:

Thus, based on the above table, in the Mature Harappan context, it may be suggested that the earliest date of the Bara culture at the above-mentioned sites cannot be earlier than circa 2200 BC and later than circa 1300 BC (Fig. 1).

B) Sites which begins with the Bara culture elements

In the table given below (Table 2), the cultural milieu of the sites does not suggest the classical Harappan stage.

Table 1

S. No.	Site	Period	Dating of Bara deposits	Remarks
	Ropar	Subperiod I C Subperiod I B Subperiod I A	circa 2100 – 1400 BC	The dates applies to the whole of the Protohistoric deposits (Sharma 1982)
	Kotla Nihang Khan	Period I	circa 2200 – 1700 BC	Largely Harappan, but Bara is also present (Sharma 1982)
	Dher Majra	Period I	circa 2nd millennium BC	—
	Rohira	Period I C	circa 2nd millennium BC	—
	Chandigarh	No period was assigned	circa 3rd-2nd millennium BC	The whole archaeological assemblage was topsy-turvy (Bisht 1976)
	Banawali	Period III	circa 1700 – 1400/1300 BC	There is stratigraphical discontinuity between the Harappa and Bara Culture (labeled as the Banawali Bara) here (Bisht 1982)
	Mitathal	Period II B	circa 1700 – 1500 BC	(Suraj Bhan 1975: 17)
	Balu	Phase C	circa 2000-1700 BC	(Shukla 1997: 9)

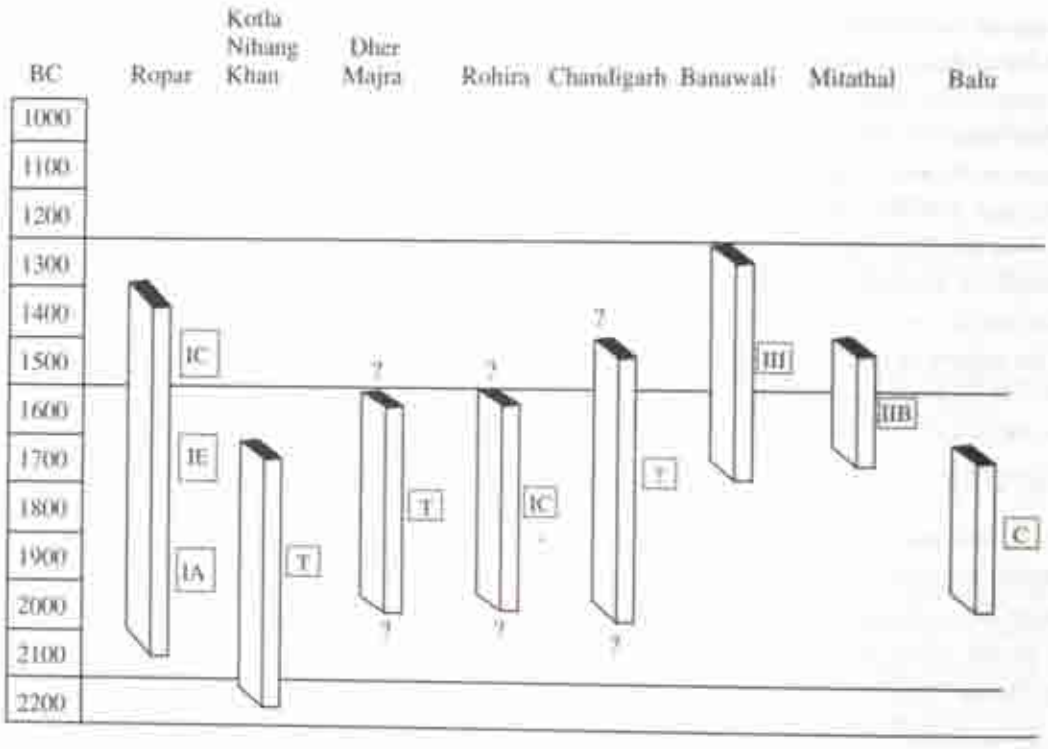


Fig. 1: Relative chronology bars of sites where Bara culture overlies the deposits of the Mature Harappan Culture

Table 2

S. No.	Site	Period	Dating of Bara deposits	Remarks
1.	Sanghol	Subperiod I C Subperiod I Subperiod I A	circa 1900-1600 BC	According to Bisht, there were only two Sub periods IA and IB (Bisht 1976). However, Sharma found Subperiod IC as overlapping with the PGW, and thus coevals with Bhagwanpura (Sharma and Sharma 1987)
2.	Daulatpur	Period I	circa 1700-1500 BC	(Singh 1994)
3.	Mirzapur	Period I	circa 1700-1500 BC	(Singh 1994)
4.	Alamgirpur	Period I	circa 1900-1700 BC	General estimation
5.	Hulas	Period I (Lower Phase, Middle Phase, Upper Phase)	circa 2000-1000 BC	(Dikshit 1982)
6	Bahadarabad	stratification	circa 2nd millennium BC	Pottery was recovered during digging a canal
7.	Ambkheri	Period I	circa 1900-1700 BC	General estimation
8.	Bargaon	Period I	circa 1900-1700 BC	General estimation

but follows it showing intermingling of definitive Bara cultural assemblage.

In the table 2, all sites show that in the late Harappan context, the earliest date of the Bara culture can not be pushed back beyond circa 2000 BC at the earliest and circa 1000 BC at the latest (Fig. 2).

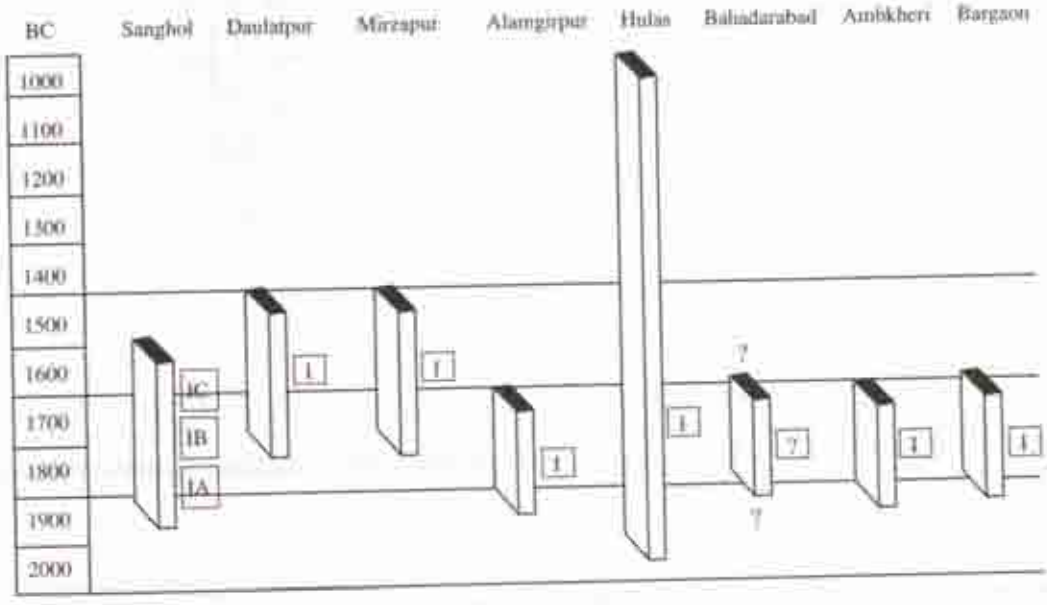


Fig. 2: Relative chronology bars of sties which begin Bara culture elements

C. Sites where Bara culture elements overlap with the other Chalcolithic/Post Harappan cultures

We have the following main sites where an overlap is noticed between late Harappan and the succeeding Chalcolithic culture. In these sites Bara culture always figures as a latter contemporary of the late Harappan and succeeded by the cultures of non-Harappan Chalcolithic Grey Ware, and finally, the Painted Grey Ware.

Table 3 : Sites where Bara culture is succeeded by PGW between C. 1700-1000BC

No.	Site	Period	Dating of Bara Deposits	Remarks
1	Bhagwanpura	Subperiod 1B	1400-1000 BC	Overlapping phase (Joshi 1993)
		Subperiod 1A	1700-1300 BC	Late Harappan (Joshi 1993)
2	Dadheri	Subperiod 1B	1400-1000 BC	Co-eval with Bhagwanpura 1A
		Subperiod 1A	1700-1300 BC	And 1B (Joshi 1993)
3	Katpalon	Period 1	1400-1000 BC	Co-eval with Bhagwanpura 1B (Joshi 1993)
4	Nagar	Period 1	1400-1000 BC	-do-

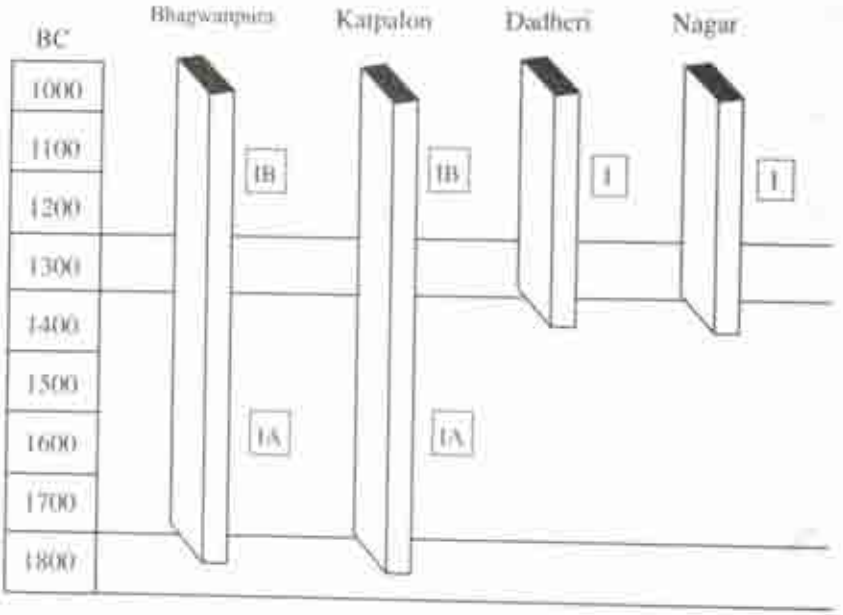


Fig. 3: Relative chronology bars of sties where Bara culture elements overlap with the other Chalcolithic/Post Harappan Culture

Table 4

SS. No.	Field Date	Lab. No.	C14 ages in BC (Based on half life 5730 years)	Remarks
1.	Bara 6.2.1971	TF–1204	1845+/- 155	Middle level
2.	Bara 5.3.1971	TF-1205	1890+/- 95	Depth is 2.20 m below surface, which is almost middle level of the total deposit of 4m.
3.	Bara 5.4.1971	TF-1206	1280+/- 100	Inconsistent date as the sample comes form an earlier level, but gives the later date
4.	Bara 7.5.1971	TF-1207	1645+/- 90	Upper level, but not from the top

D. Single (Bara) culture site

Four charcoal samples from Bara were dated by C^{14} dating methods, as reproduced below (Sharma 1973):

In the above table, if we accept the date of sample no. 1205, which was collected from almost the middle level of the site, the beginning of site may go at least to circa 2000 BC (if not circa 2100 BC), and end safely up to circa 1500 BC. A modest dating Bara, therefore, would be from circa 2000 to 1500 BC (Fig. 4).

In the context of above, it may be noted that Sharma has also excavated another site in Punjab namely Mahorana, District Sangrur in Punjab (Sharma 1987: 157–176). Here, according to Sharma, in Period IA, he has found 80% of pre-Harappan (Kalibangan I / Sothi) pottery and 20% of Bara pottery. This proportion however,

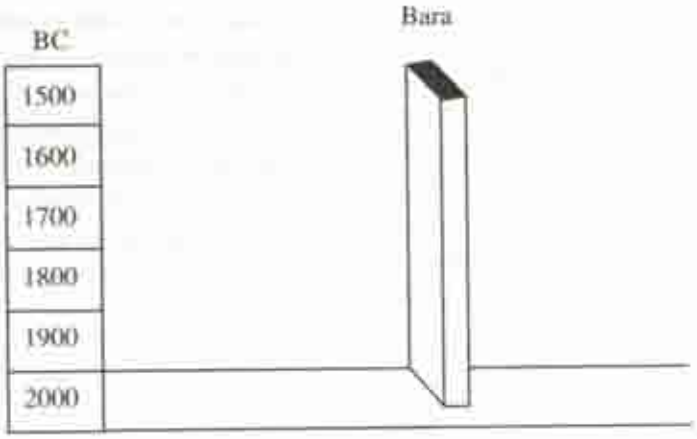


Fig. 4: Chronology bars of Bara culture at Bara site

progressively narrows down to 50 : 50 in the middle level (labeled as layer 9), and finally the percentage of Bara pottery goes up to 90% in contrast to 10% of the pre-Harappan Kalibangan pottery in Period 1 B (ibid.: 158). The schematic cultural profile at Mahorana is given at Table 5 below:

Table 5

Period	Culture	Layers	Remarks	Date
		1	Pre-Harappan: Bara : 10:90	Circa 2100-1900 BC
		2		
Period I B	Bara	3		
		4		
		5	Bara more than 50 %	
		6		Circa 2300-2100 BC
		7		
		8		
Period I A		9	Indeterminate object from this layer onwards. Reversal of pottery starts from here.	
		10	Pre-Harappan: Bara : 80:20	
	Pre-Harappan (Early Harappan)	11	Predominantly present-Harappan	

Schematic Cultural Profile at Mahorana (after Sharma 1987)

Conclusion

The findings of Sharma (1987) indicate that the genesis of the Bara culture had already taken place before the beginning of the late Harappan phase at least, which is usually placed towards the beginning of the second millennium BC (Sharma 1987: 159). It is an open issue whether "Early Kalibangan" material of Sharma at Mahorana should be taken as Early Harappan as per his analysis or not. Recent researches in Harappa archaeology may place it in early Harappan phase (Mughal 1982) or Regionalization Era of the Harappan civilization (Shaffer 1992: 447). The available data discussed here suggests a chronological horizon of the Bara Culture stretching from at least circa 2300 BC (Mahorana evidence) or circa 2100-2000 BC (Bara evidence) to circa 1500 BC (Sanghol evidence) or circa 1000 BC (Bhagwanpura evidence).

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Salvaging the Vanishing Harappans in Haryana

TEJAS GARGE *

Archaeological record today is largely affected by human activities. The scale of destruction is enormous, especially due to long-term development projects, which modify the landscape to a great extent. The Green Revolution of early 1970 has played a major role in making India a self-sufficient country in food production. However, at the same time, it proved devastating for archaeological mounds, especially so in Haryana. Generally, archaeological sites are located on the riverbanks. In case of Haryana, there is no living perennial river. In the past, there were a few perennial rivers, which have either dried up or changed their courses. However, the fact remains that their beds are still in the water catchment area; and in the rainy season, they are full of water. The ground water table is good in the bed of these dried-up channels, which is beneficial for the agriculturists who are using modern technology for harvesting their fields. Modification of landscape and destruction of the archaeological deposits has become rapid with the introduction of advanced machines like tractors. As a result, levelling down archaeological mounds is everyday phenomenon.

Importance of Haryana in the Harappan studies can be understood by looking at the distribution pattern of Harappan sites in India. Haryana has highest number of Harappan sites with 323 sites, followed by Gujarat with 230, Punjab 147, Uttar Pradesh 133, Rajasthan 75, Chandigarh 4, Himachal Pradesh 3, Delhi 1, Jammu 1 and Maharashtra 1 (Misra 1994:512). In near future, there will not be any scope of archaeological research in Haryana if the current pace of destruction continues. The present author visited archaeological mounds in Haryana with an objective of examining their present condition. An attempt is also made to describe their cultural properties, as some of these sites may disappear in near future.

Rakhigarhi (29°17'21.4" N; 76°06'47.9" E)

Rakhigarhi is a well-known archaeological site in the Chautang (ancient Drishadvati) valley located in Tehsil Narnaund, District Hissar. Acharya Bhagwan Dev was the first to detect the relics of ancient mound spread close to these villages. Later on in 1964, Suraj Bhan of Kurukshetra University confirmed the Harappan nature of these mounds. Silak Ram of Kurukshetra University described the mounds as 'mountainous' and reported Pre- Harappan and Harappan pottery types with some antiquities (Silak Ram 1972: 77-8). R.S. Bisht of Archaeological Survey of India located the Pre-Harappan settlement in northwestern locality of Rakhi-Shahpur revenue limits, now

* Archaeological Survey of India, New Delhi

archaeologically designated as RGR-6. A clear picture of Rakhigarhi was obtained only after the large-scale excavations for three seasons (1997-2000) carried out by Amarendra Nath of the Archaeological Survey of India (Nath 1998, 1999, 2001). He calculated total area of the site as around 105 hectares and designated the seven mounds as RGR-1 to RGR-7.

RGR-1 has 6 m cultural deposit, belonging to the Early and Mature Harappan period. Though this mound is relatively free of encroachments, it is very much an area of day-to-day activities of the villagers. A concrete platform, used for cremation, is seen on the northeastern portion of the mound. The southern slope of the mound has an enclosure built of bricks while the northern periphery of this mound is damaged by agriculture. This mound has also been used as a burial ground. Recently Archaeological Survey of India has undertaken fencing of this mound.

RGR-2 is on the northern periphery of the village Rakhi-Shahpur. The total cultural deposit here is 14 m belonging to the Early and Mature Harappan period. This mound is relatively free from encroachment. It is used by the villagers to dry and store cow-dung cakes, locally known as '*barwas*'. RGR-3 is a 12 m high mound, fairly intact except for a cave dug on the northern side. The eastern periphery of this mound has an open section of 2 m along with burnt brick wall with almost 18 courses. This area is subjected to vandalism for soil and burnt bricks.

RGR-4 is the largest among these mounds with 17 m of cultural deposit. This mound is entirely encroached by the modern village of Rakhi Khas and Rakhi Shahpur. A tall wide-open section on the northern fringe of this mound, roughly 76 m long and 17 m tall at the highest point suggests that it was an important area. A huge mud brick platform is visible in the section alongwith several layers of occupation. A huge 'S'-shaped storage jar with button belly was seen in the section until 2001, which is no more there. Few more storage jars are still seen in the section. Archaeological investigation of this mound would prove rewarding. RGR-5 is a small mound very close to the east of RGR-4, separated by road, now entirely levelled to the ground.

RGR-6, located to the west of the village, slightly away from the main group of mounds, has a 6 m thick deposit, which is purely Early Harappan in nature. This area is entirely under cultivation; the mound is noticeable only because of its slight elevation and the presence of potsherds. RGR-7 is a burial mound located to the north of the village. It is also completely encroached by cultivated fields. The excavations revealed nine skeletons belonging to the Mature Harappan period (Nath 2001:43-6); one can assume that there would have been many more which were vanished due to agricultural activity.

The surveys and subsequent excavations at Rakhigarhi (1997-2000) put the extent of the site around 124 hectares, and if the land between different mounds is taken into account, it exceeds beyond 240 hectares. It is unfortunate that such a large Harappan site (probably the largest on the Indian side) could not be given full justice due to encroachment.

Lohari Ragho (29°10′ 27″ N; 75°32′42″ E)

Lohari Ragho is a small village in the Hissar district of Haryana. It can be approached from Hansi via Sisai or from Narnaund via Rakhigarhi. Three mounds are located close to village Lohari Ragho. The distance between Mound I and Mound II is approximately 950 m, while Mound II is 1.5 km away from Mound III. Thus, these three mounds can easily be treated as separate entities. Archaeological remains at Lohari Ragho were noticed for the first time by Dhoop Sing and Chanderpal Sing from the Department of Archaeology and Museums, Haryana (IAR-*1980-8:16*). They have reported two mounds (I and II), both being Late Harappan in nature. This site reappears in an article by J.P. Joshi (1984) who ascribes Sothi- Siswal period to it.

Lohari Ragho I: This is the closest mound to village Lohari Ragho, only 1.5 km away from the village, towards the eastern side. It is completely encroached by agricultural fields except the central part of it. The mound measures 402 m north-south and 277m east-west. The thickness of habitation deposit is 2.5 m. A good amount of potsherds,

burnt-brick fragments and stone debitage is visible on the surface. The Ceramic Assemblage collected from surface indicates the presence of Sothi-Siswal, Mature Harappan and Historical periods. Lot of debitage of red sandstone and few fragments of quartz and chert are also reported. At present, the original contours of the mound have been vanished, the mound being almost reduced to the ground level. After a few more years, it will not be possible to even notice this mound.

Lohari Ragho II: This mound is located approximately 950 m away towards south of Lohari Ragho-I. It is approachable by dirt track from Lohari village as well Gamada Village. The central part of the Lohari Ragho-II is covered by natural vegetation and shrubs. The area around shrubs is being levelled down by agriculture. The thickness of habitation deposit is not more than one meter. This mound is spread 276 m north-south and 218 m east-west. The surface is full of potsherds scattered all over. The pottery indicates typical Mature Harappan period as well as Historical deposit. Antiquities include terracotta cakes, stone sling balls, hopscotches etc. Brickbats of burnt brick as well as some complete burnt bricks measuring 30 x 15 x 8 cm are seen on the surface. The brick size ratio of 3:2:1 indicates the presence of Mature Harappan phase.

Lohari Ragho III: This mound is located 3 km northeast from Lohari village and only 5.5 km away from Rakhigarhi to the southwest. The mound is roughly oval in shape and is now modified into stepped agricultural fields of rectangular and square shapes. Though its central portion is levelled by tractor, it remains as a raised block almost 3.5 m above the ground level. In section, it looks like a stepped platform. This mound is distinguishable from the surrounding by its whitish grey appearance. Potsherds are seen in large quantity all over the surface of the mound. Brickbats and stone objects are also seen. The mound is spread 354 m east-west and 277 m north-south. In northeastern side of the mound, patches of ash and burnt bones fragments are noticed on regular intervals. These white patches of ash are in round or oval shapes (diameter approximately 0.70 to 1.5 m). Over-burnt terracotta *mavtikas* or round terracotta cakes are noticed around the white patches. Early Harappan period is represented by thin sherds of grooved and incised pottery. They are confined to the fields on the eastern side; Mature Harappan sherds are found in western, northern, southern and in central parts of the mound.

The soils around Lohari Ragho are not suitable for agriculture; still modern agricultural practices and canal irrigation have enabled agriculture. As a result, almost each piece of land is brought under cultivation. It has led to drastic changes in the landforms as natural sand dunes and old habitation deposits have been levelled down.

Salimgarh (29°10'27" N; 75°32'42" E)

The village Salimgarh, on the left bank of Chautang, lies 21 km to the west of Hissar town in Haryana. The mound, approximately 150 m inside the agricultural fields, is clearly visible from the road. The parent material of the area around the mound is aeolian sand. The surrounding area, including the entire mound, is under mustard cultivation. Instead of levelling down the elevation, mound is converted into stepped formation. Originally, the mound was probably oval; but today it appears rectangular in shape, 200 X 150 m, survived upto a height of 3.5 m.

The credit of reporting this site goes to Suraj Bhan (Bhan, 1972:43). He identified this site as Early Harappan in nature. However, besides Early Harappan, Mature Harappan and Historical pottery is also collected from the surface of the mound. Fragments of sandstone querns, polishers made in quartzite are also yielded. Few burnt bricks with 21 x 13 x 7 cm size i.e., of 3:2:1 ratio, are found on the surface of the mound. This confirms to the presence of Mature Harappan deposit.

Despite the considerable damage on the periphery, the flat tabletop measuring 50 x 50 m in the centre of the mound still offers good opportunity for further archaeological investigation.

Siswal (29°13'14.4" N; 75°30'26.2" E)

The Siswal village is located 26 km to the west of Hissar. It can be approached from Adampur Mandi. The mound is situated 300 m to the north of the village on the left bank of the Chitang Canal. Suraj Bhan reported this site for the first time and according to his description, the mound was 300 x 200 x 2.5 m in area with north-south as the longer axis. The northeastern portion of the site was converted into suitable terraces for cultivation. He sank a small trench of 2 x 2 m in 1970. The maximum habitation deposit found here was 1.25 m above the natural soil. He divided cultural deposit into Siswal A and Siswal B. He characterized Siswal A by the presence of classical Kalibangan I – A to E fabrics. He has also noted a clear trend of evolution in typology from the lowest to the upper levels. The evolved shapes are compared to Mitathal I pottery. He has also reported sherds of Mature Harappan period from surface of the mound (Bhan 1972: 42-3,100-3).

At present, a multi-roomed, double-storied house is constructed on top of the 1.5 m remaining deposit of the mound of Siswal. Although the mound is not levelled down to the ground level, almost all the surface area on top of the mound is covered by the house. The pottery recovered from the sections and from surrounding fields shows classical Early Harappan types like chocolate slipped ware, red ware with black paintings, etc. Thick and sturdy sherds of storage jars and perforated jars belonging to the Mature Harappan period are noticed here.

There remain a few questions unanswered about Siswal culture, e.g. - how different is Siswal A from the Kalibangan I? Is it really a distinct regional culture? The Siswal B sherds also appear to be a part of less studied regional variety of the Mature Harappan period. All these questions could be answered only through fresh archaeological investigations. However, if one looks at the rapid pace of disturbance and disappearance of the mounds, it seems a distant possibility.

Sotha (29°22'34.4" N; 76°04'41.0" E)

So far, an unnoticed archaeological mound near Sotha village in Hissar district was brought to light during the explorations. Its Harappan nature is also identified, based on the ceramic assemblage found on the surface of the mound. It is located approximately 350 m to the southeast of the village. A slow rise in gradient can be noticed, from the village to the mound. The cart road approaching the mound is full of fine sand, while archaeological deposit is overlying natural alluvium rising about 5 m, now mostly surrounded by agricultural fields.

Though a large part of the mound is destroyed, still it measures 762 m north-south and 181 m east-west. Western half of the mound is almost destroyed because of the diggings for soil, whereas eastern half is almost intact, although under cultivation. Exposed sections show that out of the 5 m deposit, cultural debris is not more than 2 m in thickness. A live demonstration of destruction of archaeological mound was witnessed at Sotha. A huge trench (a common feature, nowadays, on almost all archaeological mounds at Haryana) was dug to accommodate a tractor-trolley. Another tractor was digging soil from the surface of the mound and shoving a large amount of soil into the trolley in the ditch (Pl. 5). With the current speed of destruction, this mound will not survive for another year.

The potsherds found on the surface of the mound mostly comprised of red ware with black paintings. Main noticeable shapes were storage jar, globular pots, etc. A few burnt brick fragments with mature Harappan ratio of 1:2:3 are recovered from here. The overall cultural material can be assigned to late Mature Harappan period. The proximity of Sotha to Rakhigarhi is another factor for realizing the importance of the site. It will be not possible to study the true nature of the parent – satellite relationship among the archaeological sites if mounds like Sotha are destroyed.

Shyamalo Kalan- I (29° 12´30˝ N; 76° 23´57˝ E)

Amar Singh of Kurukshetra University reported two localities close to the village Simlo Kalan; 16 km to the southeast of Jind on the way to Rohtak. In his words, *"The site lies 1 km northwest of the village which has been levelled and is partly under cultivation and partly occupied by the brick kiln. Locally known as 'Khera', it covers an area about 150 x 135 x ½ m. Potsherds of Pre- Harappan and Late Harappan culture were found on the site. A few pieces of faiance bangles were also recovered from the site"* (Singh, 1981:93-4). The reason to quote this is that, it is the last description of the site. Now this mound is entirely destroyed by a brick kiln; finding even a few potsherds is difficult now.

Shymalo Kalan - II (29° 12´ 09˝ N; 76° 23´ 20˝ E)

This is another mound in the jurisdiction of the same village, located on Shyamali – Ghatoli road further connected to Jind-Rohtak road. It is situated ½ km ahead in the southern direction from the village on the left bank of the canal. The remains of the mound measures 114 x 62 x 3.5 m, the longer axis being in the north-south direction. In 1981, Amar Sing reports the measurements of the site as 160 x 130 x 2½ m (Singh, 1981:94). The existing section of the mound shows that the mound is considerably damaged; first, by the metalled road and then by a tractor-trolley trench. The sections of this cut were observed and a few potsherds could be picked up from the each level. Approximately four layers were visible in the section. First layer is very thin and blackish-brown in colour. The second layer is yellowish brown, almost 14 cm thick; the third one is greyish brown, about 20 cm thick and the bottommost layer is of grey colour. Importantly, potsherds are recovered from every visible layer; there was no break in between. A mud structure is visible on the surface. The ratio of the brick size is 1:2:4, which indicate the existence of the Early Harappan levels. Singh also reports *"late Harappan pottery in abundance with a few sherds of Pre- Harappan traditions."* But the pottery recovered from the mound represents typical variety of Early Harappan Wares - incised basins with wavy pattern on the interior, chocolate slipped red ware, etc. Also are seen sherds of black-on-red ware and perforated jars of the Mature Harappan period.

A honeybee-producing centre has been constructed on the mound. The mound has also become a source of soil for plastering houses and courtyards for the villagers. Though there is not much difference in the area described by Singh, the mound is considerably damaged and will be vanished in the next few years.

Pahlwan I (29° 28´ 58.2˝ N; 76°12´12.6˝E)

The village of Pahlwan can be approached from Jind-Ludhiyana highway from Uchana village. Suraj Bhan and Jim Shaffer have reported the presence of Sothi-Siswal and OCP culture from this locality (Bhan and Shaffer 1978:62). The explorations by the present author have revealed the two ancient mounds in the jurisdiction of Pahlwan village. The mound I lie 1.5 km away towards the north-west of the village in the fields. The mound is oval in shape; measuring 320 m east-west and 160 m in north-south with 8m thick deposit at the highest point. The mound is modified to a great extent, two phases of destruction are evident, and an old cut, which divides the mound into two terraces, can be seen in the eastern part of the mound. Erosion and long exposure have made impossible to see any layers or any other features in this section. A fresh trench was being dug with the help of tractor during the authors visit. The trolley was left in the ditch and tractor was pushing soil from the surface of the mound. A buried storage jar was exposed by the tractor (which was destroyed by the same in next few minutes!) (Plate 3). The sections of this ditch revealed four layers, the first layer was yellowish brown in colour almost 60 cm thick, and the second one is greyish brown in colour and 75 cm thick. The third layer is 26 cm thick, almost blackish brown in colour and layer in the bottom is dark brown in colour with 1.2 m thickness. The amount of sand decreases from top to bottom in this section, the bottom most layer consist mostly clay. Most of the sherds reported from this site are red ware painted with black design.

Pehlwan II (29° 28′ 56.0″ N; 76° 10′ 26.3″ E)

This mound is located in the fields of the same village, but has totally vanished due to cultivation and can be recognized only because of its elevation. A structure is built over the mound. This is a low-lying flat ground, approximately 70 x 50 m with 1.5 m thick deposit. It seems to have been levelled by tractors, remaining is in the form of terraced fields.

Khima Kheri (29°14′22.9″ N; 76°23′25.4″ E)

The village Khema Kheri is situated at a distance of 14 km southeast of Jind. The mound, reported by Amar Singh (Singh 1981:89), is located 1 km to the north of the village Khima Kheri, and is approachable from Jind-Rohtak road. According to Singh's description, it was measuring 150 x 130 x 1 m. He reports Pre- Harappan and Late Harappan pottery from the site and a bullock-cart track passing through the site.

Today the mound is entirely destroyed due to deep diggings made for soil extraction. The road, which divides the site into two parts, is now metalled. The western half is almost reduced to the ground level. In the eastern portion, a 'trolley-trench' is visible. This part is hardly half a meter high from the surrounding ground level. The trench is wide enough to destroy original contours. The remaining portions of the mound are very small. Three layers are clearly visible in this trench. The top one is dark grey in colour with 60 cm average thickness. The second layer is light grey in colour with white patches and it is about 75 cm thick. The third layer is brown in colour. Most of the potsherds were collected from layer1.

The mound, which was spread in 150 x 130 m area, is reduced now to 50 x 50 m area with distorted contours reducing the further chances of archaeological investigations.

Gosai khera (29°12′46.4″ N; 76°22′21.0″ E)

This mound is located on the way to the village Khima Kheri from Jind Rohtak road. It is located to the south-west of village Gosai Khera in district Jind. It is reduced to the ground by agricultural fields. The road that has passed over the mound has saved archaeological deposit beneath it. The road is slightly elevated from the surrounding fields. At present, the remains of the mound measure 110 m east-west and 70m north-south. The ceramic assemblage points towards Late Harappan period.

Jogan Khera (29°58′49.3″ N; 76°47′48.7″ E)

The ancient mound near the village Jogan Khera is situated 4 km to the west of Harsha-ka-Tila, Thaneshwar in Kurukshetra district. The ancient debris is on the right bank of river Saraswati over alluvium deposit. The mound is spread over 300 x 300 m area, rising 5 m above the surroundings. It seems that originally, the mound was in oval shape, but the soil diggers have destroyed it on a large scale. Not only cultural deposits, but also natural soils below it are also dug up to 7 m. Cultural deposits on the southern and northern edge are comparatively better preserved. Late Harappan and PGW sherds are reported. On the southern periphery, many kilns and furnaces are visible on the surface, it was probably an industrial settlement. The Department of Archaeology and Museums, Haryana, carried out excavations at Jogan Khera in 2003-04.

Discussion

The reason to describe archaeological mound in details has a dual purpose:- first of all this is an attempt to record and publish rapidly vanishing archaeological sites for which information may not be available in the future and another is to sound an alarm for scholarly community to take note of this problem seriously. The main question here is that how can we make difference in the given situation?

The ground reality is that many of the mounds are not protected by the Central or State Government. The protected mounds like Rakhigarhi have problems like encroachment, illegal digging for bricks and soils, etc. The ownership of most of the mounds is private, preliminarily subjected to cultivation. As we have noted earlier, mounds

under cultivation are being levelled down rapidly. The condition of the mounds under the ownership of *Panchayats* is worst; where in many cases it is noticed that *Panchayat* auctions mound for soil. The contracts are leased to take out soil. This is the fastest and most devastating way of destruction of archaeological mounds in Haryana- Punjab region. Again, question is how to stop this? It is not possible for an individual person, private or government agency to stop this destruction. However, collective efforts by various agencies and individuals can save this wealth of archaeological information.

Role of an individual has been always important in archaeological explorations. The surveys carried out by Sir Aurel Stein and A. Ghosh revealed the archaeological potential of this area. Due to efforts of individuals like Suraj Bhan, U.V. Sing, Silak Ram and many others, numerous archaeological sites, especially Harappan, are reported in Haryana. Faithful recording and reporting in terms of publication can lead to great deal of understanding archaeological potential of an area. Unfortunately, most of this work lies unpublished and unchecked. Long lists of Harappan sits compiled by J.P. Joshi (1984) and Possehl (1999) are preliminary in nature, based on unpublished dissertation works. The sites reported in Indian Archaeology – A Review or Notes Section of Puratattva are also in the list form, giving very sketchy information. In many cases, geo- coordinates, tehsil, ownership, approach road to the site, condition of the mound, details of ceramic assemblage, antiquities, etc. are missing. The publication of exploration report in detail is quite important and still awaiting in case of Haryana. The role of individual efforts has to be acknowledged in terms of realizing the archaeological potentials of a given area. However, excavation and protection is certainly beyond the capacity of an individual.

Most of these individuals were associated with educational institutions like university departments. The Kurukshetra University, Rohtak University have carried out explorations and small-scale excavations in Haryana. Though a few excavation reports are published, exploration works largely remained unpublished. The educational institutions can play a crucial role for public education.

No doubt that the role of the Central and State Governments is extremely important as these are the nodal agencies to carry out preservation and excavation of the archaeological mounds on a large scale. The normal process of declaration of an archaeological site as a protected site may take long time, which does not keep pace with the rapid destruction process of archaeological record in Haryana. Acquiring lands (which bear archaeological mounds) by government may take again longer time and practically it is not easy to acquire all archaeological mounds.

Proposition

A practical solution over this problem seems to be initiation of a special project of salvage archaeology involving the central government, state government, universities and most importantly local *Panchayat* communities. A team of archaeologist from these agencies can take up work of exploration and recording of all archaeological sites in Haryana with a common documentation format. Besides exploration, this team can also take meetings with local farmers by help of the *panchayat*. The meetings will target at educating the villagers and requesting them not to cut down or level archaeological mounds. They can undertake cultivation as per the prescribed norms by the Archaeological Survey of India. Local educational institutions can play an important role in this process. Next logical step would be digging a trial trench on each reported site and thereby identifying sites for large-scale archaeological excavations. The process of protection for the important mounds can be initialized. The ultimate goal of this exercise should be the publication, in form of monographs, etc., of fast-vanishing archaeological data on the Harappan Sites in Haryana. It is our sacred duty to preserve this past, frozen in the form of these mounds, as a part of national heritage and to keep alive the possibilities of future research.

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Site Catchment Analysis of the Chalcolithic Settlement of Gilund in the Banas Basin

DEBASRI DASGUPTA*

Introduction

Site catchment analysis is the study of the relationship between human needs (e.g. technological ones) and natural resources lying within the economic range or catchment area of individual archaeological site (Higgs and Finzi 1970). It also gives ample idea about the economic condition of the people at the site. The subsistence followed by the ancient people becomes clear with this analysis as also the trade relations with other sites. Catchment area is the area exploited by the human population for its natural resources and lies within a reasonable walking distance from the site. This walking distance has been assumed to be of 5 km in the case of agricultural societies and 10 km in the case of hunting-gathering societies based on ethnographic work (Higgs, 1975). A site catchment analysis was conducted around the site of Gilund to understand the reasons for the selection of this site by the pioneer settlers for settling down and the consequent flourishing for the site into a regional centre.

The Area of Research

The study area of the present research is situated in the Rajsamand district of Rajasthan. It includes the Ahar culture site of Gilund and its catchment area. This area has been demarcated in a radius of 10 km. The site of Gilund is located on the right bank of the Banas River about 75 km northeast of Udaipur. The Aravalli ranges running across the state of Rajasthan divides the state into two distinct geographical divisions: Marwar and Mewar. Marwar or the western part of Rajasthan is covered by vast stretches of sand and sparse thorny vegetation. The eastern part of Rajasthan known as Mewar is fertile, rocky and hilly. Gilund falls in the Mewar region of Rajasthan. The general topography around the site can be described as undulating. The soil in the area is very fertile and conducive for the growth of crops like wheat, barley, maize, millets, cotton and sugarcane. The area is watered by the Banas river system.

The early farming culture that flourished in southeastern Rajasthan from late fourth millennium BC to mid-second millennium BC is known as the Ahar culture after the type-site Ahar near Udaipur or as the Banas culture after the Banas River. Ahar culture was essentially a river valley culture. All the sites of this culture are located on or in the vicinity of the river banks. Nearly hundred Ahar culture sites are known so far. Most of these are located in the area lying between 24°-27° latitude and 73°-76° longitude, covering the valleys of the river Banas and its

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tributaries in the districts of Udaipur, Chittorgarh, Bhilwara, Ajmer, Tonk and Jaipur in Rajasthan.

The excavated sites of this region, viz., Gilund, Ahar, Balathal and Ojiyana, have yielded a typical ceramic assemblage comprising White-painted Black-and-Red Ware. It brought to light a culture using painted and wheel made ceramics, specialized blade/flake industry, use of copper and subsistence based on hunting, agriculture and pastoralism. These people developed and flourished with growing trade contacts with the Harappans after 2600 BC. These sites show the clear evolution of the Chalcolithic cultures over a period of time. The early phase yielded a community staying in wattle-and-daub structures and using coarse, ill fired and hand-made pottery. The middle phase saw the rise of fortifications, storage structures, wheel-made pottery and deluxe pottery. The construction was mainly done in mud brick and stone. In the Late Phase, the structures are again made of wattle and daub and the ceramic becomes coarse indicating decline (Shinde *et al.* 2001 - 02).

Site Catchment around Gilund

With the help of toposheets, an on-foot survey was carried out in an area of 10 km radius of Gilund. The location and nature of subsistence resources as well as raw material resources was analyzed. These included cultivated fields, barren lands, pasturelands, type of soil, type of flora and fauna, source of bricks and other materials needed to construct buildings, clay for pottery and terracotta objects, semi precious stones, sources of water, etc. within this area as well as the numerous sites located here. These were all documented properly. The satellite settlements have been described along with the raw material resources located in the radius of 0-10 km from the site of Gilund. These settlements played an important role in the economy of Gilund.

To study the past it is also necessary to understand the changes in the environment that took place over the period of thousand years since the sites were occupied. The study area at present enjoys semi-arid climate and a similar type of climate prevailed during the Chalcolithic times with slightly higher precipitation (Singh 1971). As the landscape during the Chalcolithic period was more or less the same, modern land-use categories can safely be used to reconstruct Chalcolithic land-use categories. Further, it can also be presumed that the distribution of ancient and modern resource areas correspond to one another.

Site Catchment in 0-1 km Radius

This area has black soil, which is very fertile. The ancient farmers would have practised intensive agriculture. The pastureland available in a radius of 1 km is indeed negligible (Fig. 1).

Site Catchment in 1-2 km Radius

In the radius of 1-2 km of Gilund, 94% is arable land, 2% barren land due to stone outcrop and 4% pastureland (Fig.1). The soil here is also very fertile black cotton soil. The ancient farmers must have intensively cultivated this area also.

Animal fodder *rijhka* is grown here. Along the fields are trees of *imli/tamarind*, *khajur*/date, *papita*/pappaya, *jamun*/rose-apple, *ber*/jujube, *neem*, *babool*/acacia and *aam*/mango. Crops grown here during the rainy season are *urad*/horse-bean, *moong*/ green colour lentil, *makka*/maize, *moongfali*/ peanut, *tilli*/ sesame, *guvar*/cluster bean etc. Crop for the *Kharif* season is *jawar/millet*. Crops grown during winter or Rabi season are wheat, *chana*/peas, *jau*/ *barley*, *methi*/fenugreek *sarson*/mustard and *peeli sarson*/ yellow mustard. Brinjal, tomatoe, peas, cauliflower, cabbage, spinach, carrot raddish, ginger, coriander, fenugreek leaves, green chillies is also grown. Cash crop or cotton is grown during the winter season. These are the common crops grown in the 10 km catchment area of Gilund.

The river Banas passes at a distance of 1.20 km north of the site of Gilund. It is a semi-perennial river. At present, cows, buffaloes, jackal, fox, sheep, goat and *nilgai* drink water from here. This could also have been an important

point for hunting of animals during the past. The excavations have yielded bones of a variety of hunted wild animals like deer, antelope, chital, blackbuck, etc. There is ample grass available along the banks of the Banas River. The pasture here is more suitable for small animals like sheep and goats. The ancient inhabitants of Gilund also depended heavily on Banas for sustenance, as this was the only source of water for them.

The first farmers of Gilund used mud bricks for the construction purposes. Even today, one such area is located at a distance of 1.5 km south-southeast of Gilund and the other brick kiln is located 2 km west-southwest of Gilund. It is quite likely that the Chalcolithic people exploited the same source of clay. Sandstones, granites and quartzite are found all along the bank and bed of the Banas. These provided the raw materials to the first farmers for preparing stone objects like hammerstones, rubberstones, saddle querns, sling balls etc. Nalli, a stream, which joins the Banas, flows at a distance of 2 km to the southeast of Gilund. Granite, quartzite, sandstone are found on its bed also and in areas wherever river water passes. The sand on the Banas bed and in the vicinity of the village of Gilund is full of mica. Quartz outcrops were also observed all along the banks and also on the bed of the Banas in small outcrops and also as nodules and pebbles. Quartz has been extensively used for making microlithic tools at the site of Gilund. Schist was observed along the bank and bed of the Banas.

Satellite Settlements in 1-2 km Radius

1. Dhulkhera is a Chalcolithic site. This site most likely was a herding unit as it is situated in the middle of the pastureland 1.5 km north-northeast of Gilund. It could also have been a site for manufacturing lithics, as it is situated next to the quartz deposit. It also had some historical potsherds. The site of Dhulkhera is a small mound measuring 54 m (E-W) and 38 m (N-S) m and with a deposit of 1 m.

2. Khera is a Chalcolithic site located at 1.5 km to the west of the Gilund and on the right bank of the river Banas (Fig.1). This site is located at the end of a small field. This could have been a lithic manufacturing site as well as agricultural and pastoral site. This can be said on the basis of the fact that the site Khera is situated in the middle of agricultural and pastoral fields. It is also situated in the vicinity of the quartz deposit, which is 1 km to the north of this place.

3. Kumhakhera (25°01' 20" N, 74°16' 18" E) is a Chalcolithic site located at a distance of 1.5 km east-northeast of Gilund. This site seems to have been a farmstead. The habitation deposit is 2 m. The site of Kumhakhera measures 100 m (E-W) by 75 m (N-S).

Site Catchment in 2-3 km Radius

The area within the radius of 2-3 km of Gilund has brown silt soil along with black soil (Fig.1). Arable land in this radius reduces to 86%, pasture-land increases to 10% and barren land full of stone outcrop is 4%. The cows and buffaloes graze here during the monsoon season only, as green pasture is available only during that period. Quartz outcrop extends from 2-4 km west-northwest of Gilund. There are many outcrops of quartz along with pebbles and nodules of quartz in this entire stretch. This must have amply supplied the first farmers with raw materials for their microlithic tools. A brick kiln is located 2.5 km south-southwest of Gilund highlighting the fact that the clay in the catchment of Gilund is very good. The pastoral area was amply exploited by the people of Gilund by setting up the following satellite settlements near pasture lands as also the farmsteads were set up to exploit the arable lands.

Satellite Settlements in 2-3 km Radius

4. Chatrikhera IV (25°01' 10" N, 74°13' 29" E) is a Chalcolithic and historical site located at a distance of 2.8 km southwest of Gilund. The height of the Chalcolithic habitational deposit is 3 m. The extent of the mound is 7 m (NS-EW). This site is located inside the village of Chatrikhera. Fertile lands as well as land for pasture also surround Chatrikhera. This site could have been a temporary settlement for pastoral and agricultural people.

5. Chatrikhera 1 is a Mesolithic site but Chalcolithic pottery is also found here. It is located half a km south of the Chalcolithic site. It was a habitational site of the Mesolithic people. The Chalcolithic people also seem to have come here for pasture and this was a herding unit for the Chalcolithic people.

6. Chatrikhera V is another Mesolithic mound located half a km to the north of the Chalcolithic mound situated inside the village. Chalcolithic pottery found here denotes the presence of the Chalcolithic people. Pastoral lands around the site show that this site was also a herding unit used by both the Chalcolithic and the Mesolithic people.

7. Kolpura is a multicultural site located 3 km east of Gilund. It measures 70 m (N-S) by 60 m (E-W). The height of the mound is 3 m approx. This site is situated in the midst of fertile lands and was possibly established by the Chalcolithic people of Gilund as a farmstead.

Site Catchment in 3-4 km Radius

In the area of 3-4 km radius of Gilund, the arable area declines considerably (Fig.1). There is instead an increase in pastoral land and also an increase in the area covered by different outcrops of stones viz., quartz, the raw material for making lime and plenty of black stones. The arable land constitutes 82%, pastoral area constitutes 14% and barren land due to stone outcrop will be 4%. The raw material for making lime is mainly located at a distance of 3.5 km to beyond 4 km south-southeast of the site of Gilund. The quartz outcrop continues from 3 km to 4 km west-northwest and 3 km to beyond 4 km north-northwest of Gilund. That early man utilised these raw material sources is evident from the fact that lime has been used profusely in lining the storage pits at the site of Gilund. A brick kiln is located at 3.8 km south-southwest of Gilund. The Chalcolithic man exploited the arable land and the huge pasture area, which is evident by the fact that they set up two satellite settlements in the area. A satellite site, Gangas, was also quite near to the quartz outcrop and the raw material for lime.

Satellite Settlements in 3-4 km Radius

8. Gangas is a multicultural site, which has both Chalcolithic and historical deposit and is located at a distance of 4 km north-northwest of Gilund. The mound is surrounded on all sides by both pastureland and arable land. This seems to have been a temporary settlement of the Chalcolithic people that was used for agricultural and pasture area. It measures 107 m (N-S) by 56 m (E-W) with 2 m thick habitation deposit.

9. Gurjaniya is a Chalcolithic site located at a distance of 4 km east-northeast of Gilund and located between the villages of Jawasiya and Gurjaniya. This site is situated on the left bank of the Banas. Fertile agricultural lands surround this site. As it is situated right on the banks of the Banas, the water level is also very high. Gurjaniya was definitely a farmstead settlement. This is a huge mound of Chalcolithic period. It is spread in an area of 2 acre.

Site Catchment in 4-5 km Radius

This area in the radius of 4-5 km of Gilund is very good for agricultural purposes (Fig.1). The area used for pasture decreases as also the area under outcrop of stones rendering that part barren. Arable land constitutes 88%, pastoral area 10% and barren land due to stony outcrops constitutes 2% of the total area. The raw material for making lime plaster is again found in this area as it continues from its earlier location from 3.5-4.5 km south-southeast of the site of Gilund. Another source for making lime is located at a distance of 4-5 km north-northwest of Gilund. The quartz outcrop continues from 3 km to 5 km north-northwest of Gilund. A brick-making kiln is located at 5 km west of Gilund. The Chalcolithic people must have utilized the clay in the entire catchment, as this raw material is ideal for making bricks and pottery. One Chalcolithic site was located in this area.

Satellite Site in 4-5 km Radius

10. Karmakheri is a Chalcolithic site located 5 km west-northwest of Gilund. The site measures, 81 m (E-W) by 49

m (N-S). The height of the mound is 1.30 m from the surrounding ground level. This seems to have been a farmstead of the Chalcolithic people as it has fertile area around it.

Site Catchment in 5-6 km Radius

This area has again plenty of arable as well as pastoral land and seems to have been utilized by the first farmers by setting up a campsite at the present location of Pachamta Powerhouse (Fig.2). Of the total area here, arable land is 90% and pastoral land is 10%.

Satellite Settlements in 5-6 km Radius

11. Pachamta Powerhouse is a Chalcolithic site. It is located 6 km to the west of Gilund (Fig. 2). This site is situated on a mound having a height of " m. This site also seems to have been a herding unit. The area immediately around the mound is used for pasture. A little less than " km to the north of the mound is arable lands.

Site Catchment in 6-7 km Radius

In the radius of 6-7 km of Gilund, the arable land is 90% and the pastoral land is 8%. The first farmers amply exploited these conditions is clear from the fact that three Chalcolithic sites were located within this area (Fig.2). One brick kiln is located 7 km north-northwest of Gilund and another 6.9 km west south west of Gilund.

Satellite Settlements in 6-7 km Radius

12. Ganeshpura is a multicultural site, which has both Chalcolithic and historical deposits. This is situated 7 km southeast of Gilund. This site is surrounded by cultivable lands. This seems to have been a farmstead of the Chalcolithic people. The soil here is *kali* (black soil). The Chalcolithic deposit is only a few metres thick below the historical deposit. The height of the mound (habitation deposit) is 4 m (approx) and the extent around 2 hectares.

13. Pachamta, situated at 7 km west of Gilund, is a multicultural site having Chalcolithic and historical deposits. This site seems to have been an agricultural and pastoral settlement of the Chalcolithic people as there are both fertile and pastoral lands around the site. This site is divided into a number of mounds which are 3-3.5 m on an average.

14. Surawas, situated at 7 km northwest of Gilund, is a multicultural site having Chalcolithic and historical deposits. The site is situated next to a brick kiln in the fields of Surawas. The area around has fertile fields. The soil is *kali mitti* (black soil). Pasture area is also next to the fertile fields at least half kilometre north of this area. This area seems to have been a farmstead of the Chalcolithic people. The intact mound measures 115 m (NE-SW). The height is 3 m (approx). The Chalcolithic pottery comprises thick Coarse Red Ware and Coarse Grey Ware which is well-fired. Mostly body sherds and only one rim sherd were found here.

Site Catchment in 7-8 km Radius

In this area, the arable land is 86%, pastoral land is 10% and barren land due to stony outcrop is 4%. The early men seem to have exploited this area by setting up two farmsteads and one pastoral site (Fig.2). Quartz outcrop is located at a distance of 7 km west-southwest to 8 km southwest of Gilund and beyond. This outcrop also includes raw material for making lime plaster. Quartz outcrop is also located at a distance of 7.5 km north-northwest of Gilund to 8 km north-northwest of Gilund and beyond. Another quartz outcrop is located at 7.8 km to the north of Gilund to 8 km north of Gilund and beyond. A brick kiln is located at a distance of 7.5 km west of Gilund.

Satellite Settlements in 7-8 km Radius

15. Arni is a Chalcolithic site located 7.5 km to the northeast of Gilund. It is situated amidst fertile fields of Arni. The site measures 49 m (N-S) by 27 m (E-W) in extent. It has a habitation deposit of 1.5 m. This was probably a farmstead set up for exploiting the fertile lands around.

16. Bethumbi is situated 8 km northwest of Gilund. This site is spread in an area of more than 3 acre, having at least 5 mounds. This site has mainly historical and medieval deposits as the Chalcolithic pottery is few and far between. This could be identified as agro-pastoral camp of the Chalcolithic people as cultivable and pastoral lands surround it.

17. Damana Dam is situated 8 km southeast of Gilund and in the dam of Damana and this site is also surrounded by pastureland. This could be a herding unit. It measures 24 m (E-W) by 30 m (N-S) and habitation deposit is 1.40 m. The mound has potsherds and quartz pieces scattered on it.

Site Catchment in 8-9 km Radius

The arable land within the radius of 8 km to 9 km is 83%; pastoral area is 12%, and stony area rendering 5% area barren. The presence of the first farmers in this area is attested by the location of three Chalcolithic sites (Fig.2). Microlithic blade industry was one of the main features of the Gilund Chalcolithic culture and quartz was the main raw material used. These numerous outcrops of quartz were the main source of quartz for the Chalcolithic people of Gilund. Quartz outcrop continues from a distance of 8 km southwest to 9 km south-southwest of Gilund and beyond. This outcrop also includes raw material for making lime plaster. Another quartz outcrop continues from 8-9 km north-northwest of Gilund and beyond. The third quartz outcrop continues from 8-9 km north of Gilund and beyond.

Satellite Settlements in 8-9 km Radius

18. Champakheri is a Chalcolithic site located 9 km to the west of Gilund. There are two small mounds located ½ km to the southwest of the village of Champakheri. The distance between the two mounds is 30 m. The first mound is 2 m high and the second is 2.30 m high. This is probably a herding unit situated amidst pastoral lands.

19. Gopalpura is situated 8.5 km northeast of the site of Gilund. It is situated in the jungle of Gopalpura. This could be a herding unit as the presence of huge pasture area full of small shrubs surrounding it could indicate.

20. Jashma is a multicultural site, which has Chalcolithic and historical deposit. It is situated at a distance of 9 km southwest of Gilund. It is spread over an area of 4 hectare (approx.) and has a habitational deposit of 5 m. The soil all around is *lal mitti* (red soil), which is very fertile. This site must have been an agro-pastoral settlement.

Site Catchment in 9-10 km Radius

In this area, the arable land is 84%, pastoral land is 11% and barren land (largely stony outcrop) is 5%. The Chalcolithic farmers exploited resources lying in this area is evident from the four satellite settlements here (Fig.2).

Quartz outcrop continues from 9-10 km south-southwest. This outcrop also includes the raw material for making lime plaster. The quartz outcrop at 9 km north-northwest continues upto 9.5 km farther. Quartz outcrop continues from 9 km to 10 km. Another quartz outcrop is at 10 km north-northeast and it spreads to 1 km on both west and east. Another quartz outcrop at 10 km south-southeast spreads to 1 km to both north and south. The site of Aloli could have been utilized for exploiting these raw material sources.

Satellite Settlements in 9-10 km Radius

21. Aloli is a Chalcolithic site, located at a distance of 10 km northeast of Gilund. It is a small mound measuring 22 m (E-W) by 20 m (N-S) and with a habitation deposit of 1.5 m. This would have been a herding unit of the Chalcolithic people for exploiting the pasturelands all around the site.

22. Gandrop is at a distance of 10 km northeast of Gilund. This mound is at the base of a rocky outcrop. Here again the Chalcolithic deposit is found along with historical deposit. The soil around is *kali mitti* (black soil). This site would have been a farmstead as is evident from the presence of fertile land around. The area of this site would be around ¼ hectares. Habitation deposit cannot be measured as the mound is destroyed.

23. Kiron Ka Khera is a Chalcolithic site situated at a distance of 10 km northeast of Gilund. Few Chalcolithic potsherds were found around the well of Kiron Ka Khera in an area measuring 21 m (E-W) by 12 m (N-S). The height of the mound is 0.70 m. This site seems to have been a herding unit of the Chalcolithic people.

24. Nangpura is a multicultural site, which has both Chalcolithic and historical deposits. It is 10 km to the southeast of Gilund. It is located in the fields of Nangpura. The extent of the site is 100 m (E-W) by 120 m (N-S). The height of the habitation deposit is 3 m. The area all around is very fertile. The site seems to have been an agro-pastoral settlement of the Chalcolithic people.

All these sites have pottery similar to that of Gilund, viz., Black-and-Red Ware, Thick Coarse Red Ware, Thin Coarse Red Ware, Grey Coarse Ware and Black Ware.

Raw Materials from Distant Places

The raw materials used for manufacturing various artefacts found at the site of Gilund are of 16 different types. The most commonly used material is clay or terracotta. This is then followed by quartzite, quartz, shell, steatite, chalcedony, carnelian, sandstone, chert, bone, copper, granite, faience, bronze, agate, marble, turquoise and schist. Most of these raw materials were not available in the vicinity and were procured from beyond the 10 km catchment of Gilund.

Copper and Bronze: Copper objects are very few at the site. They could have obtained copper from the Aravallis and the Khetri region, located near Jaipur. It is also likely that they obtained these few copper objects from the copper hoard sites of Ganeshwar-Jodhpura. Bronze is also very rare, that could have come from the Harappans, as they were the only contemporary people aware of the technology.

Shell and Ivory: Shell and ivory could have been imported from the Saurashtra coast. Shell bangle debitage has been found at the site of Gilund showing that it was manufactured at the site. Conch shell was used which is found only in the Saurashtra coast. Bone is used at the site in making pendent, gamesman and tools.

Chert and Chalcedony: The nearest source of fine quality chert found at Gilund is near Nathdwara, which is around 40 km from the site of Gilund. Chalcedony is found in the veins of the Aravallis. It might have been procured from there and used to make beads and stone tools at the site of Gilund. The Chalcolithic people of Gilund procured chert from here and manufactured stone tools at the site. The nearest source of marble found at the site of Gilund is Chittorgarh, which is 40 km from the site. The Chalcolithic people used the marble found here.

Semiprecious Stones for Beads: Steatite beads are also found in good quantity at the site. The source of this material is found in Udaipur, Jodhpur, Jaipur, Dungarpur, Alwar and Ajmer districts in Rajasthan. It could have been obtained from Udaipur district of Rajasthan. Steatite could also have been obtained from Gujarat. Carnelian is used for making beads and Microlithic tools at the site. The most likely source for obtaining carnelian is in the North Gujarat region, along the Maharashtra border. Carnelian seems to have been procured from here and processed into finished goods at the site, as debitage has been located at the site of Gilund. Agate is very rare at the site. Few beads of agate have been located in Gilund. It was possibly imported from the Khambhat region. Turquoise is again very rare at the site. Few turquoise beads were found at Gilund. It could have come from the Persian Gulf region through the Harappans.

Conclusion

The site catchment analysis has shown that the catchment area of Gilund has mainly brown silt, black cotton soil and some pasture areas. It also resulted in the discovery of a number of satellite sites in the catchment of Gilund. These satellite settlements were used by the people of Gilund to exploit the very fertile area around the site for agricultural as well as pastoral purposes.

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Site Catchment Analysis of the Chalcolithic Settlement of Gilund in the Banas Basin

DEBASRI DASGUPTA*

Introduction

Site catchment analysis is the study of the relationship between human needs (e.g. technological ones) and natural resources lying within the economic range or catchment area of individual archaeological site (Higgs and Finzi 1970). It also gives ample idea about the economic condition of the people at the site. The subsistence followed by the ancient people becomes clear with this analysis as also the trade relations with other sites. Catchment area is the area exploited by the human population for its natural resources and lies within a reasonable walking distance from the site. This walking distance has been assumed to be of 5 km in the case of agricultural societies and 10 km in the case of hunting-gathering societies based on ethnographic work (Higgs, 1975). A site catchment analysis was conducted around the site of Gilund to understand the reasons for the selection of this site by the pioneer settlers for settling down and the consequent flourishing for the site into a regional centre.

The Area of Research

The study area of the present research is situated in the Rajsamand district of Rajasthan. It includes the Ahar culture site of Gilund and its catchment area. This area has been demarcated in a radius of 10 km. The site of Gilund is located on the right bank of the Banas River about 75 km northeast of Udaipur. The Aravalli ranges running across the state of Rajasthan divides the state into two distinct geographical divisions: Marwar and Mewar. Marwar or the western part of Rajasthan is covered by vast stretches of sand and sparse thorny vegetation. The eastern part of Rajasthan known as Mewar is fertile, rocky and hilly. Gilund falls in the Mewar region of Rajasthan. The general topography around the site can be described as undulating. The soil in the area is very fertile and conducive for the growth of crops like wheat, barley, maize, millets, cotton and sugarcane. The area is watered by the Banas river system.

The early farming culture that flourished in southeastern Rajasthan from late fourth millennium BC to mid-second millennium BC is known as the Ahar culture after the type-site Ahar near Udaipur or as the Banas culture after the Banas River. Ahar culture was essentially a river valley culture. All the sites of this culture are located on or in the vicinity of the river banks. Nearly hundred Ahar culture sites are known so far. Most of these are located in the area lying between 24°-27° latitude and 73°-76° longitude, covering the valleys of the river Banas and its

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tributaries in the districts of Udaipur, Chittorgarh, Bhilwara, Ajmer, Tonk and Jaipur in Rajasthan.

The excavated sites of this region, viz., Gilund, Ahar, Balathal and Ojiyana, have yielded a typical ceramic assemblage comprising White-painted Black-and-Red Ware. It brought to light a culture using painted and wheel made ceramics, specialized blade/flake industry, use of copper and subsistence based on hunting, agriculture and pastoralism. These people developed and flourished with growing trade contacts with the Harappans after 2600 BC. These sites show the clear evolution of the Chalcolithic cultures over a period of time. The early phase yielded a community staying in wattle-and-daub structures and using coarse, ill fired and hand-made pottery. The middle phase saw the rise of fortifications, storage structures, wheel-made pottery and deluxe pottery. The construction was mainly done in mud brick and stone. In the Late Phase, the structures are again made of wattle and daub and the ceramic becomes coarse indicating decline (Shinde *et al.* 2001 - 02).

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To study the past it is also necessary to understand the changes in the environment that took place over the period of thousand years since the sites were occupied. The study area at present enjoys semi-arid climate and a similar type of climate prevailed during the Chalcolithic times with slightly higher precipitation (Singh 1971). As the landscape during the Chalcolithic period was more or less the same, modern land-use categories can safely be used to reconstruct Chalcolithic land-use categories. Further, it can also be presumed that the distribution of ancient and modern resource areas correspond to one another.

Site Catchment in 0-1 km Radius

This area has black soil, which is very fertile. The ancient farmers would have practised intensive agriculture. The pastureland available in a radius of 1 km is indeed negligible (Fig. 1).

Site Catchment in 1-2 km Radius

In the radius of 1-2 km of Gilund, 94% is arable land, 2% barren land due to stone outcrop and 4% pastureland (Fig.1). The soil here is also very fertile black cotton soil. The ancient farmers must have intensively cultivated this area also.

Animal fodder *rijhka* is grown here. Along the fields are trees of *imli/tamarind, khajur*/date, *papita*/pappaya, *jamun*/rose-apple, *ber*/jujube, *neem, babool*/acacia and *aam*/mango. Crops grown here during the rainy season are *urad*/horse-bean, *moong*/ green colour lentil, *makka*/maize, *moongfali*/ peanut, *tilli*/ sesame, *guvar*/cluster bean etc. Crop for the *Kharif* season is *jawar/millet*. Crops grown during winter or Rabi season are wheat, *chana*/peas, *jau*/ *barley, methi*/fenugreek *sarson*/mustard and *peeli sarson*/ yellow mustard. Brinjal, tomatoe, peas, cauliflower, cabbage, spinach, carrot raddish, ginger, coriander, fenugreek leaves, green chillies is also grown. Cash crop or cotton is grown during the winter season. These are the common crops grown in the 10 km catchment area of Gilund.

The river Banas passes at a distance of 1.20 km north of the site of Gilund. It is a semi-perennial river. At present, cows, buffaloes, jackal, fox, sheep, goat and *nilgai* drink water from here. This could also have been an important

point for hunting of animals during the past. The excavations have yielded bones of a variety of hunted wild animals like deer, antelope, chital, blackbuck, etc. There is ample grass available along the banks of the Banas River. The pasture here is more suitable for small animals like sheep and goats. The ancient inhabitants of Gilund also depended heavily on Banas for sustenance, as this was the only source of water for them.

The first farmers of Gilund used mud bricks for the construction purposes. Even today, one such area is located at a distance of 1.5 km south-southeast of Gilund and the other brick kiln is located 2 km west-southwest of Gilund. It is quite likely that the Chalcolithic people exploited the same source of clay. Sandstones, granites and quartzite are found all along the bank and bed of the Banas. These provided the raw materials to the first farmers for preparing stone objects like hammerstones, rubberstones, saddle querns, sling balls etc. Nalli, a stream, which joins the Banas, flows at a distance of 2 km to the southeast of Gilund. Granite, quartzite, sandstone are found on its bed also and in areas wherever river water passes. The sand on the Banas bed and in the vicinity of the village of Gilund is full of mica. Quartz outcrops were also observed all along the banks and also on the bed of the Banas in small outcrops and also as nodules and pebbles. Quartz has been extensively used for making microlithic tools at the site of Gilund. Schist was observed along the bank and bed of the Banas.

Satellite Settlements in 1-2 km Radius

1. Dhulkhera is a Chalcolithic site. This site most likely was a herding unit as it is situated in the middle of the pastureland 1.5 km north-northeast of Gilund. It could also have been a site for manufacturing lithics, as it is situated next to the quartz deposit. It also had some historical potsherds. The site of Dhulkhera is a small mound measuring 54 m (E-W) and 38 m (N-S) m and with a deposit of 1 m.

2. Khera is a Chalcolithic site located at 1.5 km to the west of the Gilund and on the right bank of the river Banas (Fig.1). This site is located at the end of a small field. This could have been a lithic manufacturing site as well as agricultural and pastoral site. This can be said on the basis of the fact that the site Khera is situated in the middle of agricultural and pastoral fields. It is also situated in the vicinity of the quartz deposit, which is 1 km to the north of this place.

3. Kumhakhera (25°01' 20" N, 74°16' 18" E) is a Chalcolithic site located at a distance of 1.5 km east-northeast of Gilund. This site seems to have been a farmstead. The habitation deposit is 2 m. The site of Kumhakhera measures 100 m (E-W) by 75 m (N-S).

Site Catchment in 2-3 km Radius

The area within the radius of 2-3 km of Gilund has brown silt soil along with black soil (Fig.1). Arable land in this radius reduces to 86%, pasture-land increases to 10% and barren land full of stone outcrop is 4%. The cows and buffaloes graze here during the monsoon season only, as green pasture is available only during that period. Quartz outcrop extends from 2-4 km west-northwest of Gilund. There are many outcrops of quartz along with pebbles and nodules of quartz in this entire stretch. This must have amply supplied the first farmers with raw materials for their microlithic tools. A brick kiln is located 2.5 km south-southwest of Gilund highlighting the fact that the clay in the catchment of Gilund is very good. The pastoral area was amply exploited by the people of Gilund by setting up the following satellite settlements near pasture lands as also the farmsteads were set up to exploit the arable lands.

Satellite Settlements in 2-3 km Radius

4. Chatrikhera IV (25°01' 10" N, 74°13' 29" E) is a Chalcolithic and historical site located at a distance of 2.8 km southwest of Gilund. The height of the Chalcolithic habitational deposit is 3 m. The extent of the mound is 7 m (NS-EW). This site is located inside the village of Chatrikhera. Fertile lands as well as land for pasture also surround Chatrikhera. This site could have been a temporary settlement for pastoral and agricultural people.

5. Chatrikhera I is a Mesolithic site but Chalcolithic pottery is also found here. It is located half a km south of the Chalcolithic site. It was a habitational site of the Mesolithic people. The Chalcolithic people also seem to have come here for pasture and this was a herding unit for the Chalcolithic people.

6. Chatrikhera V is another Mesolithic mound located half a km to the north of the Chalcolithic mound situated inside the village. Chalcolithic pottery found here denotes the presence of the Chalcolithic people. Pastoral lands around the site show that this site was also a herding unit used by both the Chalcolithic and the Mesolithic people.

7. Kolpura is a multicultural site located 3 km east of Gilund. It measures 70 m (N-S) by 60 m (E-W). The height of the mound is 3 m approx. This site is situated in the midst of fertile lands and was possibly established by the Chalcolithic people of Gilund as a farmstead.

Site Catchment in 3-4 km Radius

In the area of 3-4 km radius of Gilund, the arable area declines considerably (Fig.1). There is instead an increase in pastoral land and also an increase in the area covered by different outcrops of stones viz., quartz, the raw material for making lime and plenty of black stones. The arable land constitutes 82%, pastoral area constitutes 14% and barren land due to stone outcrop will be 4%. The raw material for making lime is mainly located at a distance of 3.5 km to beyond 4 km south-southeast of the site of Gilund. The quartz outcrop continues from 3 km to 4 km west-northwest and 3 km to beyond 4 km north-northwest of Gilund. That early man utilised these raw material sources is evident from the fact that lime has been used profusely in lining the storage pits at the site of Gilund. A brick kiln is located at 3.8 km south-southwest of Gilund. The Chalcolithic man exploited the arable land and the huge pasture area, which is evident by the fact that they set up two satellite settlements in the area. A satellite site, Gangas, was also quite near to the quartz outcrop and the raw material for lime.

Satellite Settlements in 3-4 km Radius

8. Gangas is a multicultural site, which has both Chalcolithic and historical deposit and is located at a distance of 4 km north-northwest of Gilund. The mound is surrounded on all sides by both pastureland and arable land. This seems to have been a temporary settlement of the Chalcolithic people that was used for agricultural and pasture area. It measures 107 m (N-S) by 56 m (E-W) with 2 m thick habitation deposit.

9. Gurjaniya is a Chalcolithic site located at a distance of 4 km east-northeast of Gilund and located between the villages of Jawasiya and Gurjaniya. This site is situated on the left bank of the Banas. Fertile agricultural lands surround this site. As it is situated right on the banks of the Banas, the water level is also very high. Gurjaniya was definitely a farmstead settlement. This is a huge mound of Chalcolithic period. It is spread in an area of 2 acre.

Site Catchment in 4-5 km Radius

This area in the radius of 4-5 km of Gilund is very good for agricultural purposes (Fig.1). The area used for pasture decreases as also the area under outcrop of stones rendering that part barren. Arable land constitutes 88%, pastoral area 10% and barren land due to stony outcrops constitutes 2% of the total area. The raw material for making lime plaster is again found in this area as it continues from its earlier location from 3.5-4.5 km south-southeast of the site of Gilund. Another source for making lime is located at a distance of 4-5 km north-northwest of Gilund. The quartz outcrop continues from 3 km to 5 km north-northwest of Gilund. A brick-making kiln is located at 5 km west of Gilund. The Chalcolithic people must have utilized the clay in the entire catchment, as this raw material is ideal for making bricks and pottery. One Chalcolithic site was located in this area.

Satellite Site in 4-5 km Radius

10. Karmakheri is a Chalcolithic site located 5 km west-northwest of Gilund. The site measures, 81 m (E-W) by 49

m (N-S). The height of the mound is 1.30 m from the surrounding ground level. This seems to have been a farmstead of the Chalcolithic people as it has fertile area around it.

Site Catchment in 5-6 km Radius

This area has again plenty of arable as well as pastoral land and seems to have been utilized by the first farmers by setting up a campsite at the present location of Pachamta Powerhouse (Fig.2). Of the total area here, arable land is 90% and pastoral land is 10%.

Satellite Settlements in 5-6 km Radius

11. Pachamta Powerhouse is a Chalcolithic site. It is located 6 km to the west of Gilund (Fig. 2). This site is situated on a mound having a height of " m. This site also seems to have been a herding unit. The area immediately around the mound is used for pasture. A little less than " km to the north of the mound is arable lands.

Site Catchment in 6-7 km Radius

In the radius of 6-7 km of Gilund, the arable land is 90% and the pastoral land is 8%. The first farmers amply exploited these conditions is clear from the fact that three Chalcolithic sites were located within this area (Fig.2). One brick kiln is located 7 km north-northwest of Gilund and another 6.9 km west south west of Gilund.

Satellite Settlements in 6-7 km Radius

12. Ganeshpura is a multicultural site, which has both Chalcolithic and historical deposits. This is situated 7 km southeast of Gilund. This site is surrounded by cultivable lands. This seems to have been a farmstead of the Chalcolithic people. The soil here is *kali* (black soil). The Chalcolithic deposit is only a few metres thick below the historical deposit. The height of the mound (habitation deposit) is 4 m (approx) and the extent around 2 hectares.

13. Pachamta, situated at 7 km west of Gilund, is a multicultural site having Chalcolithic and historical deposits. This site seems to have been an agricultural and pastoral settlement of the Chalcolithic people as there are both fertile and pastoral lands around the site. This site is divided into a number of mounds which are 3-3.5 m on an average.

14. Surawas, situated at 7 km northwest of Gilund, is a multicultural site having Chalcolithic and historical deposits. The site is situated next to a brick kiln in the fields of Surawas. The area around has fertile fields. The soil is *kali mitti* (black soil). Pasture area is also next to the fertile fields at least half kilometre north of this area. This area seems to have been a farmstead of the Chalcolithic people. The intact mound measures 115 m (NE-SW). The height is 3 m (approx). The Chalcolithic pottery comprises thick Coarse Red Ware and Coarse Grey Ware which is well-fired. Mostly body sherds and only one rim sherd were found here.

Site Catchment in 7-8 km Radius

In this area, the arable land is 86%, pastoral land is 10% and barren land due to stony outcrop is 4%. The early men seem to have exploited this area by setting up two farmsteads and one pastoral site (Fig.2). Quartz outcrop is located at a distance of 7 km west-southwest to 8 km southwest of Gilund and beyond. This outcrop also includes raw material for making lime plaster. Quartz outcrop is also located at a distance of 7.5 km north-northwest of Gilund to 8 km north-northwest of Gilund and beyond. Another quartz outcrop is located at 7.8 km to the north of Gilund to 8 km north of Gilund and beyond. A brick kiln is located at a distance of 7.5 km west of Gilund.

Satellite Settlements in 7-8 km Radius

15. Arni is a Chalcolithic site located 7.5 km to the northeast of Gilund. It is situated amidst fertile fields of Arni. The site measures 49 m (N-S) by 27 m (E-W) in extent. It has a habitation deposit of 1.5 m. This was probably a farmstead set up for exploiting the fertile lands around.

16. Bethumbi is situated 8 km northwest of Gilund. This site is spread in an area of more than 3 acre, having at least 5 mounds. This site has mainly historical and medieval deposits as the Chalcolithic pottery is few and far between. This could be identified as agro-pastoral camp of the Chalcolithic people as cultivable and pastoral lands surround it.

17. Damana Dam is situated 8 km southeast of Gilund and in the dam of Damana and this site is also surrounded by pastureland. This could be a herding unit. It measures 24 m (E-W) by 30 m (N-S) and habitation deposit is 1.40 m. The mound has potsherds and quartz pieces scattered on it.

Site Catchment in 8-9 km Radius

The arable land within the radius of 8 km to 9 km is 83%; pastoral area is 12%, and stony area rendering 5% area barren. The presence of the first farmers in this area is attested by the location of three Chalcolithic sites (Fig.2). Microlithic blade industry was one of the main features of the Gilund Chalcolithic culture and quartz was the main raw material used. These numerous outcrops of quartz were the main source of quartz for the Chalcolithic people of Gilund. Quartz outcrop continues from a distance of 8 km southwest to 9 km south-southwest of Gilund and beyond. This outcrop also includes raw material for making lime plaster. Another quartz outcrop continues from 8-9 km north-northwest of Gilund and beyond. The third quartz outcrop continues from 8-9 km north of Gilund and beyond.

Satellite Settlements in 8-9 km Radius

18. Champakheri is a Chalcolithic site located 9 km to the west of Gilund. There are two small mounds located ½ km to the southwest of the village of Champakheri. The distance between the two mounds is 30 m. The first mound is 2 m high and the second is 2.30 m high. This is probably a herding unit situated amidst pastoral lands.

19. Gopalpura is situated 8.5 km northeast of the site of Gilund. It is situated in the jungle of Gopalpura. This could be a herding unit as the presence of huge pasture area full of small shrubs surrounding it could indicate.

20. Jashma is a multicultural site, which has Chalcolithic and historical deposit. It is situated at a distance of 9 km southwest of Gilund. It is spread over an area of 4 hectare (approx.) and has a habitational deposit of 5 m. The soil all around is *lal mitti* (red soil), which is very fertile. This site must have been an agro-pastoral settlement.

Site Catchment in 9-10 km Radius

In this area, the arable land is 84%, pastoral land is 11% and barren land (largely stony outcrop) is 5%. The Chalcolithic farmers exploited resources lying in this area is evident from the four satellite settlements here (Fig.2).

Quartz outcrop continues from 9-10 km south-southwest. This outcrop also includes the raw material for making lime plaster. The quartz outcrop at 9 km north-northwest continues upto 9.5 km farther. Quartz outcrop continues from 9 km to 10 km. Another quartz outcrop is at 10 km north-northeast and it spreads to 1 km on both west and east. Another quartz outcrop at 10 km south-southeast spreads to 1 km to both north and south. The site of Aloli could have been utilized for exploiting these raw material sources.

Satellite Settlements in 9-10 km Radius

21. Aloli is a Chalcolithic site, located at a distance of 10 km northeast of Gilund. It is a small mound measuring 22 m (E-W) by 20 m (N-S) and with a habitation deposit of 1.5 m. This would have been a herding unit of the Chalcolithic people for exploiting the pasturelands all around the site.

22. Gandrop is at a distance of 10 km northeast of Gilund. This mound is at the base of a rocky outcrop. Here again the Chalcolithic deposit is found along with historical deposit. The soil around is *kali mitti* (black soil). This site would have been a farmstead as is evident from the presence of fertile land around. The area of this site would be around ¼ hectares. Habitation deposit cannot be measured as the mound is destroyed.

23. Kiron Ka Khera is a Chalcolithic site situated at a distance of 10 km northeast of Gilund. Few Chalcolithic potsherds were found around the well of Kiron Ka Khera in an area measuring, 21 m (E-W) by 12 m (N-S). The height of the mound is 0.70 m. This site seems to have been a herding unit of the Chalcolithic people.

24. Nangpura is a multicultural site, which has both Chalcolithic and historical deposits. It is 10 km to the southeast of Gilund. It is located in the fields of Nangpura. The extent of the site is 100 m (E-W) by 120 m (N-S). The height of the habitation deposit is 3 m. The area all around is very fertile. The site seems to have been an agro-pastoral settlement of the Chalcolithic people.

All these sites have pottery similar to that of Gilund, viz., Black-and-Red Ware, Thick Coarse Red Ware, Thin Coarse Red Ware, Grey Coarse Ware and Black Ware.

Raw Materials from Distant Places

The raw materials used for manufacturing various artefacts found at the site of Gilund are of 16 different types. The most commonly used material is clay or terracotta. This is then followed by quartzite, quartz, shell, steatite, chalcedony, carnelian, sandstone, chert, bone, copper, granite, faience, bronze, agate, marble, turquoise and schist. Most of these raw materials were not available in the vicinity and were procured from beyond the 10 km catchment of Gilund.

Copper and Bronze: Copper objects are very few at the site. They could have obtained copper from the Aravallis and the Khetri region, located near Jaipur. It is also likely that they obtained these few copper objects from the copper hoard sites of Ganeshwar-Jodhpura. Bronze is also very rare, that could have come from the Harappans, as they were the only contemporary people aware of the technology.

Shell and Ivory: Shell and ivory could have been imported from the Saurashtra coast. Shell bangle debitage has been found at the site of Gilund showing that it was manufactured at the site. Conch shell was used which is found only in the Saurashtra coast. Bone is used at the site in making pendent, gamesman and tools.

Chert and Chalcedony: The nearest source of fine quality chert found at Gilund is near Nathdwara, which is around 40 km from the site of Gilund. Chalcedony is found in the veins of the Aravallis. It might have been procured from there and used to make beads and stone tools at the site of Gilund. The Chalcolithic people of Gilund procured chert from here and manufactured stone tools at the site. The nearest source of marble found at the site of Gilund is Chittorgarh, which is 40 km from the site. The Chalcolithic people used the marble found here.

Semiprecious Stones for Beads: Steatite beads are also found in good quantity at the site. The source of this material is found in Udaipur, Jodhpur, Jaipur, Dungarpur, Alwar and Ajmer districts in Rajasthan. It could have been obtained from Udaipur district of Rajasthan. Steatite could also have been obtained from Gujarat. Carnelian is used for making beads and Microlithic tools at the site. The most likely source for obtaining carnelian is in the North Gujarat region, along the Maharashtra border. Carnelian seems to have been procured from here and processed into finished goods at the site, as debitage has been located at the site of Gilund. Agate is very rare at the site. Few beads of agate have been located in Gilund. It was possibly imported from the Khambhat region. Turquoise is again very rare at the site. Few turquoise beads were found at Gilund. It could have come from the Persian Gulf region through the Harappans.

Conclusion

The site catchment analysis has shown that the catchment area of Gilund has mainly brown silt, black cotton soil and some pasture areas. It also resulted in the discovery of a number of satellite sites in the catchment of Gilund. These satellite settlements were used by the people of Gilund to exploit the very fertile area around the site for agricultural as well as pastoral purposes.

As a result of this study, it was found that agriculture and pastoralism were equally important in the economy of Gilund. The establishment of satellite settlements around Gilund suggests the prevalence of chiefdom society, which was visible at the site of Balathal (Sinha 1998). The Gilund people seem to have produced enough surplus to exchange agricultural products for other trade objects like copper or semi-precious stones like turquoise, agate, etc. The richness of the Chalcolithic phase at the site could be attributed to this flourishing trade.

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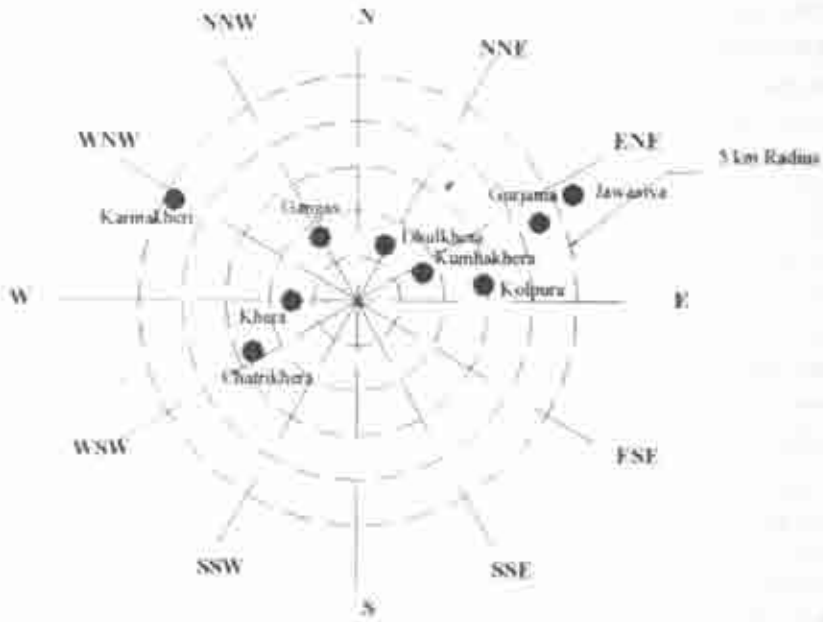


Fig. 1: Satellite sites of Gilund in 0-5 km catchment area

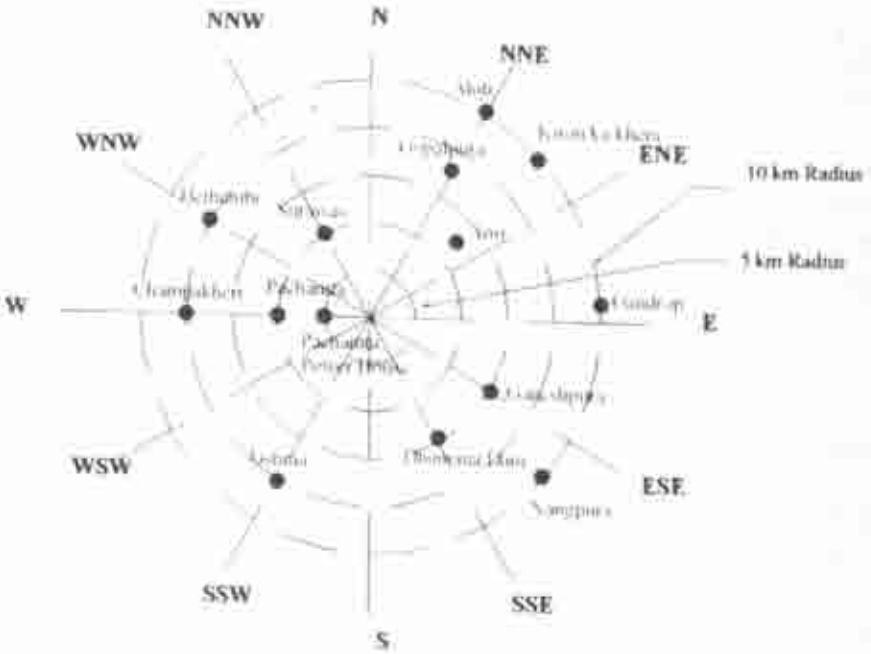


Fig. 2: Satellite sites of Gilund in 0-5 km catchment area

Geoarchaeological Observations of Man Basin in Solapur District, Maharashtra

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Introduction

Till recently, the evidence of the Early Historic, particularly of the Satavahana period in Maharashtra lacked any reference to the Middle Bhima basin, alongwith its tributaries like Sina and Man, due to lack of any archaeological work. S.S. Hampe took this topic for his doctoral research and some preliminary archaeological explorations in Solapur district were undertaken beginning from 2001 (Hampe and Joglekar 2002). Several new archaeological sites of historic and medieval period were noticed. Notable among them are Mudvi, Dharmagon, Kasegon, Khawaspur, Ucchethan, Bathan and Siddhapur. Of these, the sites of Mudvi on the right bank of river Man and Siddhapur on the right bank of Bhima have been excavated (Shinde *et al.* in press; Shinde *et al.* 2004). The data gathered on the cultural material of the Bhima-Man region point to the occupation during the Early Historic and Medieval periods as evidenced from the pottery finds, hero stones and associated material (Shinde *et al.* 2004). Thus systematic survey of the area revealed that the region of Bhima-Man basin is rich in archaeological record, which gave a fresh impetus to archaeological and related investigations in last couple of years.

The main aim of this work is to highlight the potential of this region as far as the research in historical archaeology is concerned. So far, 10 sites of various cultural periods have been found on the river Man (Table 1). These sites need to be studied properly by using multidisciplinary approach including detailed geomorphology, stratigraphy, bioarchaeology and ceramic analysis. In this connection, we explored the area and this note provides a summary of geomorphic observations made in the lower reaches of the river Man.

Table 1: List of sites on river Man in Solapur District, Maharashtra (Fig. 1)

Sr.No	Site Name	Coordinates	Period & Culture Material
1	Khawaspur	17°29'41" N; 74°57'57" E	Medieval Grey Ware, Black Ware
2	Lotewadi	17°29'31" N; 74°59'57" E	Medieval Black Ware, Grey Ware

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3	Nazare	17°22'49" N; 75°02'72" E	Medieval (gadhi) Black Ware, Red Ware
4	Vazare	17°21'95" N; 75°04'85" E	Medieval Black Ware, Grey Ware
5	Balavadi	17°23'45" N; 75°02'04" E	Early Historic Red Ware, Black Ware
6	Save	17°28'63" N; 75°15'00" E	Early Historic Red Slip Ware, Black Ware, Red ware
7	Dharmagon	17°35'04" N; 75°26'99" E	Early Historic Red Slip Ware, Black Ware
8	Nepatgaon	17°34'77" N; 75°25'71" E	Medieval Grey Ware, Back Ware
9	Mudvi	17°35'17" N; 75°28'41" E	Early Historic Black Ware, Red Slip Ware, Decorated Red Ware in Black colour
10	Sarkoli	17°36'79' N; 75°29'09" E	Medieval Black Ware, Red Ware

The Area

The river Man is a tributary of the Bhima river. It occupies the Middle Bhima basin. It originates in Mahadeo range at 1016 m AMSL in taluka Man, Satara district, Maharashtra. It collects its headwaters from Dahiwadi and Mhaswad talukas in the Satara district. It flows in NW-SE directions following the trend of most of the rivers of the Bhima basin. However, it takes a sharp turn near Atpadi and moves north-eastwards to meet Bhima near the village of Sarkoli. This place is 18 km downstream of Pandharpur, the famous pilgrim centre. Climatically, Man basin is in the semi-arid zone. The average annual rainfall is 450 mm. The Man basin is the driest area in Solapur district. The fluvial system here alike other systems of the Western Ghats is affected by the highly seasonal monsoon climate.

Field Observations

The river Man flows through a shallow rocky valley developed in amygdaloidal and other vesicular varieties of basalt at an elevation of about 440 m AMSL. The gradient of the Man between Mudvi and Sarkoli is very low. Alluvial deposits with a maximum thickness of 15 m and a lateral extent of 1 to 2 km on either bank are exposed either in freshly dug wells or on the riverbank proper. These deposits have developed two cut and fill terraces in the area. The younger fill (5 m above the present channel) is inset into older fill (>5 m above the present bed level). We made detailed field observations on these alluvial fills not only in the river Man but also on the river Bhima near village Sarkoli where the Man meets the Bhima (Fig. 1). Based on these field studies we have divided these alluvial deposits into 3 major litho units which are described below (Fig. 2).

Unit I: It is well exposed on the right bank of river Bhima at Sarkoli in the alluvial fill surface (>5 m above the bed level) inset into the older surface over which the present-day village Sarkoli is situated. The fill consists of non-calcareous brownish sandy silt. About 1 m below the surface of this fill, we found animal-bone fragments, molluscan shells and pot sherds (mostly grey and black ware). A thin (5 cm) lense of greyish ash was also observed at a depth of 2.5 m below the surface (Pl. 1). We have also collected charcoal pieces for further C-14 dating. Potsherds collected are unrolled and fresh and are most likely to be of medieval period as similar type of black and grey ware potsherds have been found in a well-established medieval site of Pandharpur (Mate and Dhavalikar 1968). At village Saroli, we found one Hero-stone and some medieval ruins. From geomorphological point of view, the 5 m fill is of Late Holocene age and suggests the disturbance of medieval

site by overbank flood of the Bhima some time during the Late Holocene. Future geoarchaeological work on this site with a few C-14 dates will throw interesting light on the flood history of the Bhima during the Late Holocene.

Unit II: This unit is divided into two sub-units, Unit II A and Unit II B.

Unit II A: It consists of brownish sandy silt with moderate development of pedogenic calcrete nodules (2 to 3 cm in size) and interlayers with sandy pebbly gravel lense (about 30 cm thick) with a few microliths on chalcedony. The gravel is semi-consolidated by carbonate content and is rich in lithoclasts of compact basalt and chalcedony. About 5% lithoclasts are of laterite. The average thickness of this litho-unit is around 3 m and is found to form the uppermost part of the older alluvial fill on the right bank of the Man. At places, particularly near the confluence with the Bhima, this litho unit shows conspicuous apparent dip of 30° towards west (Pl. 2). The litho Unit II A grades into litho Unit III at this place. At Mudvi the litho Unit II is disconformably capped by archaeological habitation deposit dated to around 2000 B.P. Tentatively, the Unit II with a few microliths in a gravel lense is dated to the Terminal Pleistocene.

Unit II B: An interesting geomorphic feature in the form of regolith was observed on the plateau surface at an elevation of 460 m AMSL, about 20 m higher than the bed level of the Man and about 1.5 to 2.5 km away from the left bank of the Man. This regolith covers an area of about 2.5 sq. km and is 25-30 cm thick and caps the weathered basalt. There is disconformity between the regolith and the underlying closely jointed amygdaloidal basalt. The composition of this regolith is as follows: 15 cm reddish brownish silt with dispersed ironstone pellets having excellent chocolate brown patina grades to 10 cm yellowish brown silt sharp contact to closely jointed amygdaloidal basalt rich in chalcedony lumps and nodules. The regolith is not an in situ weathering profile, rather it appears as a soil sediment. This has two distinctive layers- one with yellowish brown (in basal part) and the other with reddish brown colour (in upper part). The soil sediment contains pellets of ironstone (hematite) ranging in size from 2 –3 mm to about 1 cm, and with glossy reddish patina.

These pellets are not allogenically derived from laterite present in the source region of the Man near Vita in District Satara. Most probably, they seem to have authegenically developed in the regolith when the Man was aggrading as revealed in Unit II. This regolith has yielded a few microliths and appears to be contemporary with gravel yielding microliths near Mudvi. Microliths were found within the lag of gravel comprising of basalt pebbles, chalcedony and few laterite pieces. Raw material in the form of quartz and chalcedony is available on the surface. It is a regular fluvial gravel with rounded pebbles of laterite. It is on the upper part of calcareous yellowish silt. The gravel is sandy-pebbly with laterite clasts.

Unit III: This unit consists of yellowish brown sandy silt, which is strongly calcretised with rhizoliths, banded lithic calcrete and strong nodules (3 to 5 cm). There are cobbly-pebbly gravel lenses (30-40 cm thick), well cemented by calcium carbonate. In this unit, thick (2 to 5 cm) calcrete bands were observed. Cross bedding in gravel is common while tilting is confined to calcretised silt bands (Pl. 3). No other soft sediment deformation structures were observed in this unit. Yellowish brown silt is locally known as '*man*' which is hard and compact and does not require stone lining in shallow dug wells. The average thickness of this Unit is about 5 m and it grades to basal Unit IV.

Unit IV: Presence of disconformity between Unit III and Unit IV is indicated by erosional contact and also by the presence of rhizolith rich hard lithic calcrete band (25 to 30 cm thick) in the upper most part of the Unit IV (Pl. 4). The lithic calcrete band is underlain by bouldery cobbly gravel, clast supported, ungraded but moderately sorted and well-cemented by calcium carbonate. Pebble lithology is dominated by compact basalt, yet other varieties of basalt like prphyritic, red tachylitic, scoraceous etc. are also present along with chalcedony and laterite. The gravel is 1.5 m thick and interlayers with brownish silt. Compact basalt pebbles have grey green patina and slow thin (2-3 mm) weathering rind. The gravel rests unconformably on

Table 2: The lithostratigraphy, tentative age and environmental conditions

Litho unit	Thickness in m	Approximate Age	Associated cultural remains and probable climate	
Unit I	4-5	Mid to Late Holocene	Medieval and Early Historic	Semi-arid
Unit II Brownish over bank silt moderate calcretisation with rare sandy-pebbly gravel lenses having a few laterite pebbles	3	End Pleistocene	Microliths	Semi-arid-Dry
Unit IIIAlternating gravel and silt deposits, with tilting, well developed calcretised lithic bands	4-5	Late Pleistocene	Semi-arid	
Unit IV Strongly calcretised, bouldery-cobbly gravel at base, resting on the basalt bedrock	2	Early Late Pleistocene	Sub-Humid	

amygdaloidal or scoraceous basalt which is common bedrock in this part of the Man.

Discussion

Chronology: Our observations in the lower reaches of the river Man show that the Man has preserved calcretised alluvial fill while the Bhima proper has non-calcretised brownish silt fill which probably rest against the calcretised alluvial fill. In the absence of any absolute dates, it is difficult to place these alluvial fills in exact frame. Archaeological evidence, however, indicates that non-calcretised alluvial fill on the right bank of the Bhima near Sarkoli is of the Late Holocene age (probably not older that 1000 years BP) and the calcretised alluvial fill on the right bank of the Man is of Late Pleistocene age. The uppermost litho-unit of this fill is of the terminal Pleistocene age, while the highly calcretised bouldery-cobbly basal gravel could be of Early Late Pleistocene (~130 ka) or even little earlier (Terminal Middle Pleistocene).

Depositional Environment: Presence of calcrete in various stages of development (from soft pellets to hard lithic type) in the older alluvial fill suggests that the climate has remained semi-arid throughout the Late Pleistocene. The fluvial responses in terms of aggradation and erosion, braiding/meandering or low sinuosity channels are due to minor fluctuations in climate and in the base level (in this case the main river Bhima). Aggradation during microlithic phase is in response to overall weakening of discharge of the Man, with rare intense floods (as indicated by gravel lenses). The climate was distinctly dry during this phase.

The regolith (Unit II A) with authegenic laterite pellets and microliths also indicates the aggradational phase with strong fluctuations in ground water. The Man was probably ephemeral stream, lost in its aggradating flood plain and with disorganised drainage. This disorganised Man was dramatically different during the early Late Pleistocene (i.e. around ~130 ka or little earlier). Heterogeneity of pebble lithology, degree of rounding of cobbles and moderate sorting observed in the Unit IV indicate that the Man was an incised river with low sinuosity and probably less ephemeral that in the Unit II stage. The climate was

relatively more wet that during the phase of Unit II. The Unit III has developed in near channel overbank floodplain environment with channel shifting and strong seasonal flow. Calcrete bands of ground water origin demonstrate fluctuations in the water budget of the Man, while rhizoliths indicate pedogensis of the exposed part of the near channel floodplain. The Man was braided, flowing seasonally in semi-arid climatic conditions probably not drastically different from the present one. These results are summarised in Table 2.

Conclusions

Our preliminary geoarchaeological field oriented studies in the lower reaches of the Man near the confluence with the Bhima brings out following salient features:

1. Early Historic and Medieval sites are preserved in the Man in association with alluvial fills primarily developed in semi-arid climate and ephemeral stream flows. Similar type of geoarchaeological context has been observed by use in the Nira basin near Shirval (Joglekar *et al.* 2004).

2. Recently Mishra *et al.* (2003) has observed that fluvial responses of streams in Upland Western Maharashtra were different in the same climatic conditions. We also observed that geomorphic responses to subtle climatic changes during the Late Quaternary (Late Pleistocene and Holocene) of the Bhima and of the Man are different. The Man cuts through the Late Pleistocene fills almost up to its confluence with the Bhima which flows through the Holocene fill, probably inset into the Late Pleistocene fill.

3. Wherever the bedrock is exposed in the wells, it is amygdaloidal and vesicular basalt. It is not represented in the gravels occurring in Unit I and Unit II.

4. Geomorphologically sandy pebbly gravel with microliths at Mudvi can be dated to the Late Pleistocene period. This could represent the major phase of aggradation during Late Pleistocene, as suggested by Mishra *et al.* in the Bhima basin. Other evidence from Upland Maharashtra is at Inamgaon where gravel with microliths and shells has been dated to 11,700±150 B.P. (Mishra *et al.* 2003). Gravel suggests periodic surges of floods. Basically, river Man is aggrading as the silt is more.

5. There is evidence of Late Holocene strong flood that has disturbed medieval occupation sites on the proper Bhima basin.

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Fig. 1: Sites on River Man in Solapur District, Maharashtra

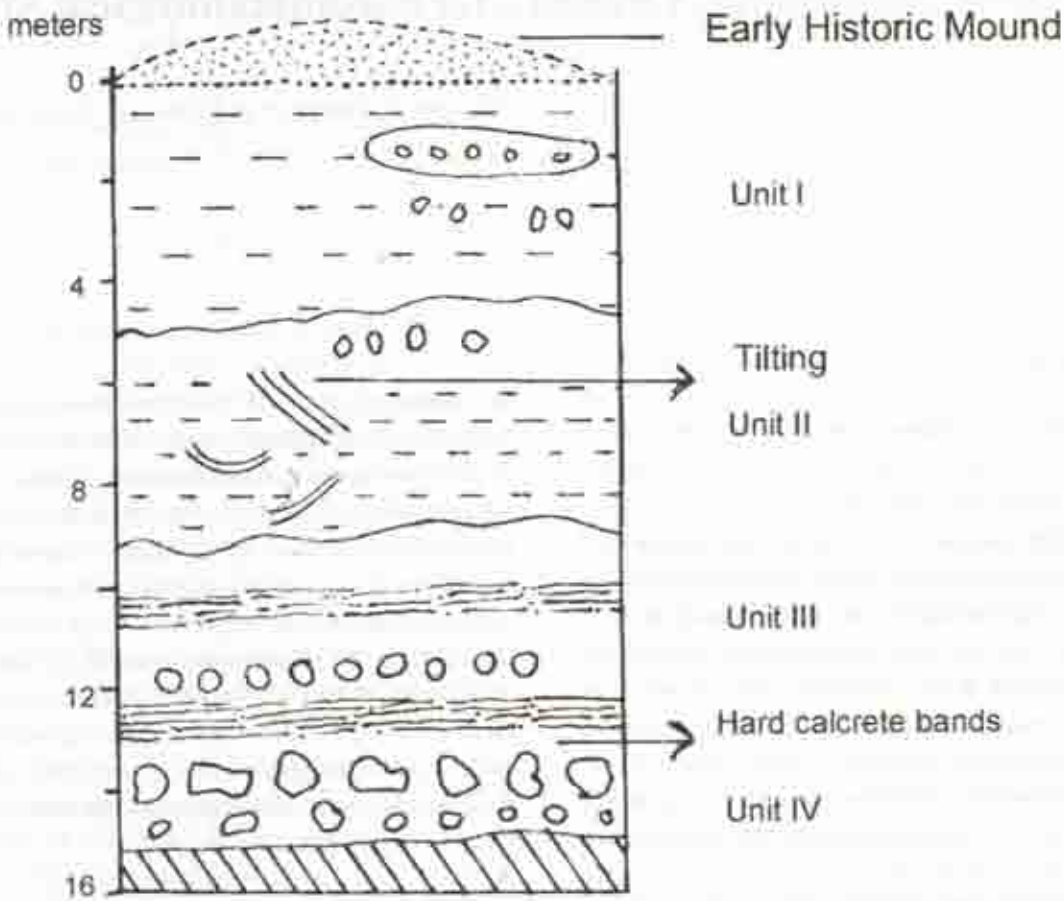


Fig. 2: Composite Section of River Man in its lower reaches

Iron Objects from the Iron Age-Early Historic Level at Badmal (Dist. Sambalpur, Orissa): Archaeometallurgical Studies

Pradeep K. Behera* & Pranab K. Chattopadhyay*

Introduction

Although the intellectual achievements of the art of Orissa have long been celebrated by several art historians, studies on the Iron Age-Early Historic archaeology of the State lag behind than that of the rest of India (Basa 1994). Until recently, except a brief report on the excavated site of Golbai Sasan, in which the excavator claimed to have identified an Iron Age level, almost nothing was known about the existence of this cultural phase in Orissa, even though it was considered as one of the most important areas of pre-industrial iron smelting in India (Ball 1881). However, systematic explorations backed by a series of test excavations conducted during the last decade have brought to light a large number of Iron Age-Early Historic sites in the middle Mahanadi valley of Orissa (Behera 2002-2003). The area, which stretches from the Hirakud Dam Reservoir to about Tikarapatha Gorge (Singh 1971) with its rich forest and mineral resources, expansive and navigable river valleys, has emerged as a distinct cultural-geographical region for understanding Iron Age-Early Historic cultural processes from a wider regional perspective.

While investigating the middle Mahanadi valley and its tributaries during 2001, the first author came across the habitation site of Badmal, which is located on the left bank of a second order perennial stream, Harihar nullah, a tributary of the Mahanadi. The site is located some 70 kilometers south-east of the district headquarters of Sambalpur. It is an isolated settlement, situated in the upper reaches of the Harihar nullah in a rocky terrain with an elevation of 150 m above mean sea level. The site (21° 06'22" N and 84°03'37" E), which spreads over an area of about 200 m x 200 m, is bounded on four sides with an earth rampart of roughly parallelogramic shape with at least three entrance ways. This is probably the earliest evidence for fortified settlement in Orissa.

Trial excavations were conducted at the site by the first author during 2002-03 under the auspices of Sambalpur University, which revealed four phases of human occupation, viz. Period IA, IB, IC & II with an occupational gap between the periods IC and II, represented by a sterile flood deposit of 30-35 cm thickness. On the basis of studies on the excavated cultural material, exposed stratigraphy and radiocarbon dates, Periods IA, IB and IC have been assigned to the Iron Age phase, while Period-II to the Early Historic phase. The three radiocarbon dates determined

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Table 1: Calibrated Radiocarbon Dates

Sl. No.	Lab. No.	Period	Trench No. & Depth from the Surface	Radiocarbon Dates (Calibrated)
1	KIA 20153 Sample-1	IB	BDM-I: Trench-II, 125cm	One Sigma Range: BC 799 – 766
				Two Sigma Range: BC 810 – 760
2	KIA 20154 Sample-2	IB	BDM-I: Trench-II, 115cm	One Sigma Range: BC 799 – 776
				Two Sigma Range: BC 810 – 750
3	KIA 20155 Sample-3	IB	BDM-I: Trench-II, 50cm	One Sigma Range: BC 775 – 759
				Two Sigma Range: BC 789 – 539

on the charcoal samples, collected from the habitation deposit of Sub-Period IB (Table1), clearly demonstrate that the middle phase of the Iron Age culture at the site flourished during the early part of the first millennium BC. Thus the initial human occupation at the site must have taken place at least one or two centuries earlier than the first millennium BC and the site continued to exist upto about 3rd-2nd century BC.

During the Iron Age period, the settlement was confined to a limited area, lying towards the highest northwestern part of the mound, and it was also without any fortification wall. People during this phase lived in wattle-and-daub houses with rammed floor. They used to use a variety of materials, viz. iron and copper objects, bone and antler tools, earthen wares of different types, precious and semi-precious stone beads, sling balls of stone, terracotta beads, pottery discs, etc. The early settlers were mainly subsisted on animal food, besides limited agriculture. The deposit of this phase yielded a large number of charred and un-charred skeletal remains of wild and domesticated animals exhibiting distinct butchery marks on them. The ceramic assemblage, which demonstrates close affinity in shape, size, colour and fabric with that from other contemporary Iron Age settlements of the middle Mahanadi Valley, is represented by Black-and-Red Ware potteries of fine to medium fabric, Red Slipped Ware, Black Slipped Ware and plain Red Ware potteries. Important shapes in the BRW are flat and round-based bowls, vases and dishes. However, vases of different sizes and forms are the predominant shapes in the RSW group. Large-sized storage vessels are rare and confined to only RW group.

During the subsequent Early Historic phase (Period-II), which began after a brief occupational gap, the size of the settlement grew to its fullest extent and it was protected on four sides with a massive earth rampart with at least three passageways. While many of the cultural features of the earlier period continued to exist, the site during this phase transformed into a very large stone bead manufacturing centre. The low-lying southern part of the mound was exclusively used for manufacturing precious and semi-precious stone beads.

The bead workers of this phase not only exploited the locally available alluvial and colluvial deposits for extracting gem quality raw materials, viz. beryls of greenish blue, golden yellow, pale blue to sea blue in colour, aquamarine of greenish blue to sea blue in colour, smoky quartz, tourmaline, amethyst and ruby, but they were also used to import suitable raw materials like banded haematite, red jasper, agate, chalcedoney, amygdaloidal basalt, onyx, coral, etc. from regional and extra-regional contexts. This part of Orissa is noted for its rich and varied gem deposits which occur mostly in colluvial context (Mishra and Mohanty 1998). A small (2 x 2.5 m) trench (Trench-III)

taken on the southern part of the mound, yielded thousands of fragments of bead waste, beads in different stages of manufacturing process, bead polishers, anvils, hammers, muller, two-legged quern, besides several iron objects like drill bits, nails, flattened rings, toothless saw fragments, etc. A large number of pottery discs (hop-scotches) of different sizes and weights (total 58 nos.), cowri shells and potteries were also yielded. There is total absence of Iron Age remains in this trench. This clearly reveals that this part of the mound was only occupied during Period-II for manufacturing beads in large scale. Among the potteries, particular mention may be made of dishes and bowls in Black-and-Red Ware and Black Slipped Ware of fine fabric and several base fragments of knobbed dishes in Black Slipped Ware. Despite technological advances with the emergence of specialized craft industry, there was no marked change in the general life style of the people of this period. People continued to live in wattle-and-daub houses.

Iron Technology at Badmal

Although iron objects have been found right from the beginning of human occupation at Badmal, no direct evidence pertaining to on-site production of this metal at the site could be registered during the limited excavations. However, definite archaeological evidence for iron smelting was recorded from the Iron Age deposit at the site of Kurumpadar (20°49'44.5"N and 84°05'59.6"E), located about thirty kilometers south of Badmal, on the right bank of the Mahanadi (Behera 2002-03). The nearest source of iron ore deposit lies about one hundred and forty kilometers northeast of Badmal.

The Table 2 clearly reveals proliferation in the typology of iron objects and also in their number during the Early Historic period at Badmal, while its use was limited to a few hunting weapons during the preceding Iron Age phase. Similar trend has also been reported from many

Table 2: Period-wise distribution of Iron Objects

Sl. No.	Tool Type	Period-wise distribution of Iron Objects				Total	%
		Period-1A	Period-1B	Period-1C	Period-II		
1	Spearhead	1	1	1	1	4	13.33
2	Arrowhead	-	1	-	-	1	3.33
3	Nails	-	-	-	5	5	16.67
4	Nail parer (?)	-	-	-	3	3	10.00
5	Drill bit	-	-	-	7	7	23.33
6	Toothless saw fragment	-	-	-	5	5	16.67
7	Flattened ring	-	-	-	3	3	10.00
8	Net sinker (?)	-	-	-	1	1	3.33
9	Clamp fragment	-	-	-	1	1	3.33
	TOTAL	1	2	1	26	30	99.99
	Percentage	3.33	6.67	3.33	86.67		

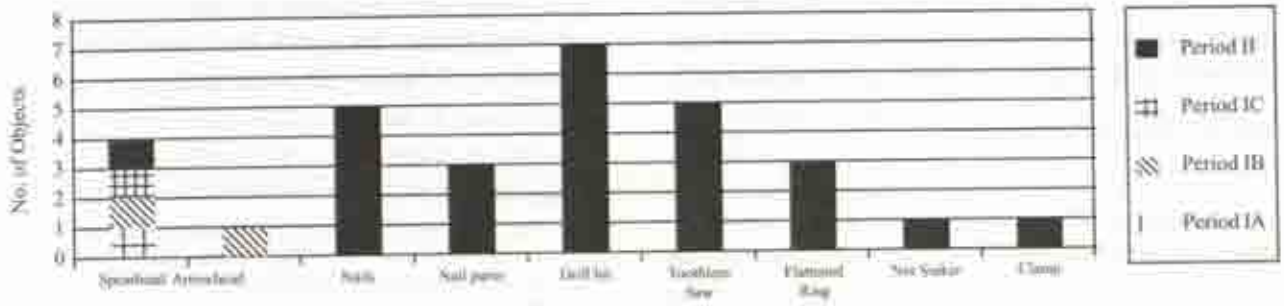


Fig. 1 : Periodwise Distribution of Iron Objects at Badmal, Orissa.

sites in India (Agrawal and Kharakwal 2003). Probably emergence of craft specialization during the Early Historic period coincided with diversification in the typology of iron objects. A period-wise distribution of Iron objects is shown below.

Metallographic Studies

Metallographic studies on select specimens from Badmal revealed the manufacturing techniques and also indicate thermo-mechanical treatment carried out on the artifacts. In the Indian sub-continent, a few remarkable contributions on the metallographic studies of iron objects have been made (Athavale 1967, Bhardwaj 1973, Agrawal 2000, Agrawal et al. 2003, Mudhol 1997, Patel 2000-2001). The second author and his associates have also made some studies to reveal the metallurgical characteristics of iron objects from Bihar, Jharkhand and West Bengal (Ghosh and Chattopadhyay 1982; Ghosh et al 1987-88; Chattopadhyay 1984, 2003, 2004; De and Chattopadhyay 1989; etc.)

Our knowledge on the metal technology of Orissa is still in its infancy. No scientific analyses were ever conducted on the iron objects recovered from the Early Historic site of Sisupalgarh. During the past, some metallographic studies were made for the iron beams of Konark (Neogi 1914, Friend and Thorneycroft 1924). Also some studies were made on the iron smelting activities at Badampahar region (Mohanty et al. 2003). The first author has also initiated some studies on the multi-elemental analyses of iron objects of the Iron Age and Early Historic levels of Kurunsingha by AAS (Behera and Mishra 2002). The results of the same do not corroborate any proposition of meteoric origin.

As mentioned earlier, only four iron objects have been selected for metallographic examination. The earliest object is a spearhead (BDM-18) recovered from period IB i.e. Iron Age level, belonging to the early part of the first

Table 3: Analysed Iron objects

Sl. No.	Trench No.	Sample No.	Depth	Object	Length mm	Breadth mm	Thickness mm
1.	BDM-I	BDM-18	75 cm	Spearhead	82.0	23.0	7.0
2.	BDM-II	BDM-7	15 cm	Drill bit	38.0	6.4	7.0
3.	BDM-II	BDM-8	15 cm	Drill bit	62.5	7.3	8.0
4.	BDM-II	BDM-16	35 cm	Toothless saw	50.5	19.0	4.2

millennium BC. Other three objects are drill bit (BDM-7), another drill bit (BDM-8) and a toothless saw (BDM-16). The details of the objects are shown in Table 3 and Fig. 2.

To begin with, all the four iron objects were subjected to External Particle Induced X-Ray Emission analysis at the Institute of Physics, Bhubaneswar, which uses 3 mv

Table 4: Composition of Iron objects

			Detected Elements in Weight % through External PIXE									
Sample No.	**Period**	**Object Type**	**P**	**S**	**Ca**	**Ti**	**V**	**Cr**	**Mn**	**Fe**	**Ni**	**Cu**
BDM-18	III	Spear head	0.15	0.13	-	-	0.13	-	0.70	95.15	0.15	-
BDM-7	III	Drill bit	0.49	0.41	0.41	0.29	0.076	-	0.58	95.76	0.29	0.12
BDM-8	III	Drill bit	0.58	0.40	0.23	-	-	-	0.44	95.71	0.27	-
BDM-16	III	Toothless saw	0.53	0.43	0.12	-	-	0.06	0.56	95.08	0.43	-

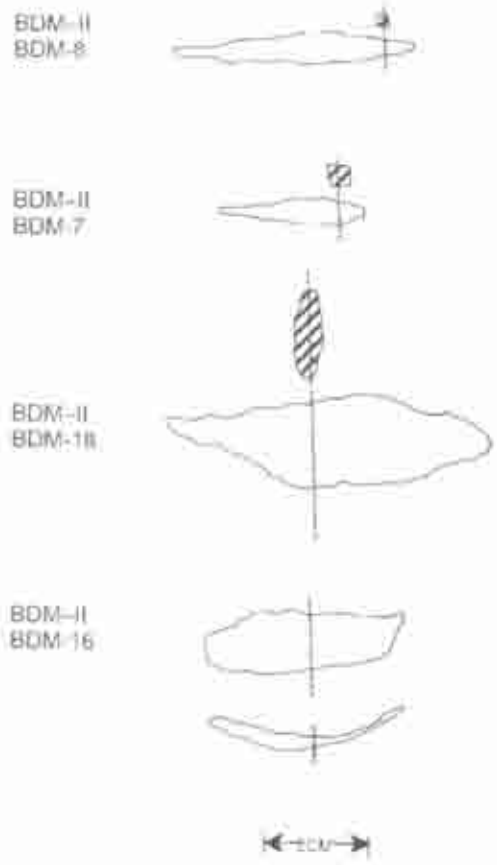


Fig.1: Sketches of Iron Objects

tandem type Pelletron Accelerator with proton beam energy of 3 MeV. This method is of special importance for the analysis of archaeological samples, since it is not only non-destructive, fast, sensitive and capable of simultaneous multi-elemental analysis, but it also ensures that any size of sample can be quantitatively analyzed without causing physical damage to the artefacts. The results of the analysis are shown in Table 4.

Besides the constituents, Table 4 clearly suggests that the ancient settlers of Badmal used to procure iron from two different sources, either in the form of ore or finished object by way of trade. The most interesting result of the analysis is the presence of vanadium in the two of the four specimens analyzed. It should be noted here that vanadiferrous magnetite deposits have been detected in the eastern boarder of Keonjhar, few pockets in Baripada-Rairangpur belt in Mayurbhanj and a few locales in the Balasore district of Orissa (Nayak and Das 1998). These areas are located some 200-300 km northeast of Badmal site. Does it suggest that the craftsmen of Badmal were importing vanadiferrous magnetite ore/or artefact from distant localities like Mayurbhanj and Keonjhar? Only future investigation backed by detailed geo-chemical and other studies will solve the question of provenance of iron at Badmal.

For metallographic analyses, small samples were collected from each of the four specimens and these were mounted on perpex through Buhler Simplimate 2 mounting press. Subsequently these specimens were observed in polished and etched conditions. Etchant used was 3% nitric acid in alcohol. Observations were made in metallographic microscopes, Leica DMLM, in different areas with different magnifications from 50 to 1000X. All the four objects were covered with thick corrosion layers but the metallic core was intact and revealed the microstructure satisfactorily. All the specimens are of nonhomogeneous grain sizes from large coarse grains of ASTM grain size 1 to very fine grains of ASTM grain size 8.

All the specimens were subjected to micro-hardness test through Leica VMHT at 2 or 3 places at 300-gram load for 15 seconds. The average Vickers Hardness Values (HV) are shown against each specimen. Slag inclusions are common in these materials. The results are shown in Table5.

BDM-18: This specimen, a spearhead, is chronologically the earliest of the lot. The microstructure indicates the presence of oxide scale and slag inclusions. Inclusions comprise silicates type. Etched specimen clearly reveals non-homogeneous grains between ASTM grain sizes from 3 to 8. Almost no evidence of carburisation is indicated by the microstructure. The average micro hardness obtained is 113.7 HV at ferrite region. Photomicrograph has been obtained at a magnification of 1000X.

BDM-8: The object has been identified as a drill bit. The microstructure, revealed at 500X, indicates a mixed structure, from elongated slag inclusions, massive ferrite and ferrite grains with Neumann bands. The later structure indicates that the object was forged at low temperature, which caused a shock; forging temperature was below 500 celsius. No evidence of annealing has been identified through the structure. Micro hardness obtained is 134.8 at ferrite region.

BDM-7: The object has been identified as a drill bit. This may be identified as low carbon steel. The microstructure revealed indicates a mixed structure. In another region, there is evidence of partial spherodization of the carbides, and Widmanstätten side plates had formed in hypoeutectoid regions.

BDM-16: The object has been identified as a toothless saw. The photomicrograph indicates a fine-grain corrosion layer with ferrite matrix. In central region, both course and fine grain matrices are observed along with pearlite grains. A few grains with Neumann bands have also been observed along with elongated slag inclusions. Micro hardness obtained in ferrite region is 110 and at pearlite region 195.6 HV.

Table 5: Micro-Hardness, the HV Values of the Specimens

Specimen	HV at ferrite region	HV at other region
BDM-18	113.7	—
BDM- 07	99.0	—
BDM- 08	134.8	441.6
BDM-16	110.0	195.6

Conclusion

The iron objects from Badmal clearly represent a thick incrustation of ferric oxide surrounding a metallic core. Strongly supported with chemical analyses of external PIXE, there is no evidence of the meteoric iron to the manufacture of the analysed iron objects. On the other hand, low level of nickel and vanadium clearly suggests the use of vanadiferrous iron ores, very much available in the state of Orissa while uniform distribution of slag materials is the clear indication of wrought iron. One of the objects may be identified as low carbon steel. The earliest iron object BDM-18 is definitely primitive in technology. In Table 4, composition of each of the iron objects is shown, but the values of silicon and aluminium contents are not shown, which are the essential constituents of the entrapped slag particles. The total slag contents therefore may be identified respectively as 3.59, 1.574, 2.37 and 2.79 percent. This clearly represents the technological improvement over the driving out of slag particles between the Iron Age and Early Historic period. Not only there is increase in the tool types, but the introduction of low carbon steel making is also visible during the post-Iron Age period. Often it is mentioned that the smiths of the Iron Age in the Indian subcontinent applied 'layering forging techniques'. With the present findings we may conclude that in case of Iron Technology the Mahanadi Valley was definitely another centre of iron making in Eastern India. Future researches will reveal the technological details in this part of the sub-continent.

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Excavation at Kopia 2005: A Preliminary Report

A.K. Kanungo and V.S. Shinde*

Site

Kopia (26°52' N; 83°4' 50" E) village is located on the Khalilabad-Bakhira road at a distance of about 12 km north of Khalilabad in the tehsil of the same name in Sant Kabir Nagar District (a sub-division of erstwhile Basti District), Uttar Pradesh. The archaeological site, consisting of a prominent mound, is located on the western fringe of the village. It extends over an area of about 1 sq km and has a height of about 10 m from the surrounding ground level (Fig. 1). First season's excavation was conducted in March-April 2004, and a preliminary report of that was published in the preceding issue of this journal (Puratattva 34: 116-123). The second season's excavation was conducted during March-May 2005, a preliminary report about its findings, mostly confined to structures, is given below.

In first season, excavation was carried out at three localities of the mound, Locality I, which is the centre of the mound, yielded habitational area with many structures. Locality II and Locality III were towards the northern end of the mound. Both of these yielded a plethora of chunks of glass, crucible pieces and other evidences relating to production of glass, and thus suggesting them to be industrial areas. In the second season, Locality III has been merged with Locality II. Due to limited excavation in the last season we could neither ascertain the total cultural sequence of the site nor establish any relation between these localities i.e., between glass making areas and the habitational area. Thus, it was decided to find out the cultural sequence this year and see how far the industrial and habitational areas were related, before conducting further excavation in glass area in the coming seasons.

Excavated Area

Ten trenches, either full or quadrants thereof [AX1, AY1, BY1 (NW & NE), OB1, OB2, OA1, OA2 (NW & SW), ATX8 (NW & NE), AVX32 (NW & NE), and AUX32 (NW & NE)], covering an area of 187.5 sq m, were selected for digging. Of these, AX1, AY1, BY1, OB1, OB2, OA1 and OA2 lie in the centre of the mound; AVX32, and AUX32 were on a small surviving northwest slope of the mound, and ATX8 was on the disturbed and ploughed northern slope of the mound. Central part of the mound was selected for obtaining the cultural sequence and information about the habitation of the mound, and northern slope was selected considering the richness of the glass finds on the surface. AX1, AY1, BY1, OB1, OB2, OA1 and OA2, which are inside the fortification and are marked as locality I, were dug down to 5.51 m depth (Pl.1).

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ATX8, which was 7.90 m down from the datum; AUX32 which was 7.34 m down from the datum; and AVX32 which was 7.45 m down from the datum, were outside the fortification and marked as locality II; and ATX8 was dug down to 9.25 m from the datum.

Stratigraphy

The whole area inside the fortification is marked as locality I. In this place, seven trenches were taken up. Among these, Trench AX1 was dug down to 1.30 m, AY1 to 3.05 m (6.05 in a soak pit); BY1 to 2.78 m; OA1 to 3.08 m; OB1 to 5.51 m; OA2 to 1.67 m; and OB2 was dug down to 1.71 m. Except in the index trench (Qd. SE of Trench OB1), where NBP was found in the bottommost three layers, in all other trenches cultural finds were of the Sunga-Kushana period. On the top of the mound, the local cultivators had put the collected bricks before 1980, when the site was declared state-protected. With time, these bricks became a compact mass, thus obliging us to remove a deposit of about 55 cm on the top and 10-20 cm on the slope. After the removal of the humus, the layer became more or less horizontal.

Cultural sequence was obtained in the southeast Quadrant of OB1 trench (Fig. 3). The earliest evidence is of Northern Black Polished Ware (NBP) of about 6th c. BC. Then there is evidence of Kushana and Sunga periods without any break. Altogether 12 layers were identified. The bottommost three layers (10-12) were of NBP, layers 8-9 were transitional and layers 1-7 were of Sunga-Kushana period. At a depth of about 2.60 m, there was evidence of burning activity in the form of ash throughout the site, the thickness of the ash varying from 40 to 60 cm in different trenches. This could be due to some kind of invasion since structures at this level seem to be disturbed. The ash layer contains a lot of cultural material.

Structures

Locality I

Substantial evidence of structures of Sunga-Kushana period was found in this locality. Excavation revealed remains of walls of structures (Fig. 2).

Trench AY1: This trench is almost in the centre of the mound where maximum habitation deposit is preserved. The upper 50 cm deposit is disturbed due to ploughing. The structural remains start immediately below the disturbed area. The stratigraphy of the trench, which is not very distinct at least down to 3 m, consists of bricks and brickbats embedded in clay almost all through the 3 m section. The presence of brickbats in the section makes identification of layers almost impossible. It is also an indicator of intensive structural activity in this area of the site.

All the structures excavated so far are made of burnt bricks of the size of 39 x 23 x 5 cm, 38 x 23 x 5 cm, 37 x 23 x 5 cm, 36 x 23 x 5 cm. The length varies from 39 to 35 cm, where as the breadth and thickness remain constant. This brick size belongs to the Kushana period and is comparable to that of sites like Sringaverpura.

All the structural remains excavated in this trench belong to the Sunga-Kushana period. However, it is possible to distinguish succeeding structural phases based on their different foundation levels and construction styles. The structures excavated in this trench can broadly be assigned to two structural levels. Each structural level is further subdivided into subphases. The construction method followed in both the structural levels shows typical header and stretcher pattern, the bricks joined together with clay mortar.

Structural Phase I

This may not be the earliest structural phase of the site. The beginning of the structural level is exactly at a depth of 3 m from northern section and is represented by several structures, a few of which are partially excavated and appear to be non-domestic. Two structures were partially excavated. One of these is a small squarish underground tank (1.04 x 1.16 m). The inner part of the structure is smoothened indicating that probably it was a water tank.

Sub-phase II: In the later stage, additional brick work was done around the small squarish tank. On the outer face of the southern and western sides of the tank is noticed construction of a single-lined brick wall, which probably runs on all sides of the tank. The bricks (38 x 23 x 5 cm) in this case are placed vertically unlike in the main wall.

Sub-phase III: On the western side of sub-phase II is noticed another thick wall (70 cm) which appears to be the periphery wall constructed later around the original structure. The outer face of the wall has a step-like section indicating that it is the outermost limit of this structure. Towards the end of this structural sub-phase, the total thickness of the wall on the western side is at least 1.10 m. This wall is standing over a base, which is made of clay and potsherds. The potsherds may have been intentionally added to clay for strengthening purpose, as stone is not easily available in this region.

On the eastern side of this tank there is a rectangular structure with a foundation made of clay mixed with burnt clay clods and potsherds. The wall on the top of this foundation has survived to a length of 46 cm and a thickness of 56 cm. The structure excavated in this area measures 2.20 m (N-S) x 0.82 m (E-W). Parts of the southern and western walls have been excavated. Since only a small portion is excavated, it is difficult to hypothesise its exact function. Both the structures described above belong to structure phase I.

The levels from 2.30 to 3.30 m depth can be associated with the earliest structural phase excavated in this trench. This is in relation to the northern section of the trench. In this 1 m thick deposit, no distinct layers can be separated.

Structural Phase II

Parts of a number of structural remains have been excavated on northern, western and southern side of the water tank of structural phase I. The structures excavated are at a much higher level indicating their different chronology. To the south of the tank of structural phase I is a large feature represented by a N-S running wall. The 56 cm thick foundation of the wall is laid at a depth of 2.20 m. The wall over the foundation is survived to a height of 1.40 m and a width of 23 cm. The original wall that crosses all the three trenches AY1, OA1 and OA2 is exposed to a length of 10.60 m. Its one corner lies 2 m to the east of the western section (of AY1) and the wall runs straight towards west through trenches OA1 and OA2 upto the western half of OA2. The wall is slightly damaged by the later people near the junction of trenches OA1 and OA2, making it an ideal example of ghost wall (Pl. 2). This wall appears to be a part of a huge structural complex lying on its southern side as a number of walls are seen to be emanating from its southern side.

To the south of the main E-W running wall at a distance of 52 cm is yet another wall parallel to the main wall. It is exposed in the corner of trench AY1. The wall exposed along the section, emanates from the N-S running wall, and is on its northern face. The wall standing over a step-like foundation is exposed to a thickness of 78 cm. Between the outer main wall and this wall, at the base, there appears to be a narrow channel, which could be identified as a water drain. This water channel has been created by placing a single course of bricks at the base of the outer main wall. The distance between this line of bricks and the foundation of the wall described above varies from 21 to 13 cm. The base of the channel is also paved with bricks and is 8 cm deep.

There is one more N-S running wall attached to main E-W running wall. It is at a distance of 4 m from the western end of the main wall. This wall, which also runs in exact N-S direction, has survived to a length of 2.15 m, and to a maximum height of 35 cm. As there is a later wall sitting on top of this wall, its exact width cannot be measured.

Sub-phase II: To the main structure described above were added more rooms on the western side at a later stage. The foundation of this sub-phase is much higher than the foundation of the main original structure. The nature of the foundation is also different from that of the main structure as this has a step-like feature. The total thickness of the foundation is 75 cm. The wall on the top of the

foundation has survived to a thickness of 70 cm and is exposed in the corner of trench AY1 to a length of 1.80 m. Inside the wall at a junction between it and the foundation is noticed a feature made of brick pavement which is exposed in an area of 3.60 m (N-S) x 1.80 m (E-W). This could be the floor level of the structure indicating that the western portion of the structure complex was probably used for dwelling purpose. There is a small water storage tank made of bricks placed vertically and bound together by mud mortar. It is 40 cm to the south of the wall close to the first N-S running wall of the original structure. It looks squarish in shape. Half of the water storage structure underlies the baulk between AY1 & BY1.

Apart from these, two other structures can be assigned to the Structural Phase II. One of them is a small platform-like feature, measuring 0.6 x 1 m with extant height of 0.75 m, exposed in BY1. The other one is a tank-like structure in OA1, measuring 1.5 x 1.65 m. It has thick walls on three sides and on top of each wall there is a small passage meant for water.

Structural Phase III

A few structural remains excavated in trenches OB2 and AX1 can be assigned to the last structural phase, i.e., Phase III. Most of the structures excavated are damaged in their upper part mainly because of their proximity to the surface. This particular structural phase is found at the base of the thick layer (no. 1) of the two trenches. Remains of two structures have been partially exposed OB2. One of these is a wall exposed to a length of 5 m and a width of 50 cm, and has a surviving height of 30 cm. It appears to be a part of a rectangular structure. The other structure excavated in this trench consists of two rooms running in N-S direction. These include a wall with a water channel on top and running in N-S direction, a thin wall between the structure and a front courtyard and two partially broken water storage tanks. The 12 cm wide and 5 cm deep water channel runs along the rear margin of the wall. The room on the northern side measures 2.50 x 1.20 m. The room on the southern side has been excavated to a length of 1 m and a width of 1.30 m. The width of the front wall is 24 cm and along the northwestern corner it has survived to a thickness of 70 cm. Outside, in the front courtyard area are located two rectangle-shaped small water tanks, almost in the centre of the front wall. One of them, which is more or less complete, is 50 cm long, 20 cm wide and 15 cm deep. The other one, which is partially broken, seems to be of the same dimensions. The front courtyard has a nicely laid brick pavement.

In trench AX1 one multi-chambered structure belonging to structural phase III has been excavated at a depth of 70 cm from the intact surface along the northern section. This structure consists of two small chambers and remains of additional rooms and small water storage tanks to the west of the western wall of the complex. A small wall running in E-W direction divides the main structure. A small chamber excavated to the south of the main chamber measures 2.20 m (E-W) x 1.10 m (N-S). The western and eastern walls of the main chamber extend further towards the south and from the eastern and western walls of yet another smaller chamber. The southern periphery wall of this chamber is damaged towards east. To the north of this wall are remains of two roughly rectangular water tanks. They are made of vertically placed burnt bricks set in mud mortar. Both of them have been damaged. However, the one on the southern side has a length of 46 cm and a thickness of 30 cm.

Locality II

The outer fortification area towards the northern end of the mound, where glass and evidence of glass production are seen in abundance, was marked as locality II unlike last year when this locality was divided into two as locality II and locality III. Depth is maintained from the highest point of the mound at AY1, which was 7.34 m higher than the surrounding ground level. In this locality, three trenches were selected, out of which digging was done in trench ATX8 down to 9.25 m, in AUX32 to 8.25 m, and in AVX32 to 8.04 m.

Digging was not carried down to virgin soil in any of the trenches in this locality, but altogether 6 layers were

encountered, though not all of them in any single trench. Cultural finds from all layers indicated them to be of Sunga-Kushana period (Fig. 4).

Except AVX32, no other trench revealed any structural feature but only glass and glass production evidence. In the northwest quadrant of AVX32 a N-S directed single brick lining placed vertically like that of last year's CCX5 trench and a regular brick wall W-E directed were beginning to appear when the excavation was closed.

Pottery

The excavation in Locality I revealed a relatively high quantity of potsherds of different wares and lower layers gave higher percentage of NBP. In Localities II and III, quantity of pottery is relatively low but size of the pots appears larger and thicker in section.

Different ceramic wares were distributed evenly in locality I, both horizontally and vertically in the excavated area. In the southern part of trench AY1, there continued to be high concentration of pottery. This season's dig yielded three large conical-shaped containers (Pl. 3) in a small area enclosed by brick lining. Rakesh Tewari is of the opinion that these are not containers but decorative pieces to be put on the corners of tiled roofs for which he furnishes ethnographic parallel. Like the last season, pottery is uniform throughout the excavated deposit. The wares remain the same with the percentage of fine grey ware (FGW) and NBP going up.

In the lower levels, NBP sherds were found in higher percentage. The lowermost layer gave the best NBP in terms of fabric and surface treatment. The shapes are predominantly dishes. One of the best specimens of nearly 2/3rd part of a dish was found in layer 12 (Pl. 4). Along with it was found an antler and both of them were placed near a typical Mauryan style hearth (Pl. 5). A good percentage of all wares except FGW and NBP is of the micaceous variety. In comparison to last season, the incidence of FGW and black-and-red ware was higher, and the majority of them are body sherds. Black ware is represented by only a few sherds. However, some of them are of very fine quality like a mouthpiece resembling a crocodile (Pl. 6). A number of intact red ware cups, globular pots and one with ears were found in the rectangular structure (soak pit) in trench AY1. There was a beautiful miniature kettle in red ware in layer 3 of trench AY1 (Pl. 7).

Material Culture

Terracotta Figurines: Twenty-two terracotta figurines were recovered from the excavation and many from surface and villagers. The majority of them belong to the Sunga-Kushana period. Most of them are fragmentary, broken at the joint; in the case of human figurines, at the junction of the head and the body. They are characterised by coarse modelling, and having large goblin-like bulging eyes (Pl. 8). The head seems to have been mould-made while the body is handmade, and both are then joined together. A good number of heads of solders are found. A *triratna* embossed terracotta skin scrubber was collected from villagers (Pl. 9). In addition, the most spectacular find was that of a figure of a ram in NBP level made in NBP technology (Pl. 10).

Metal Objects: Seventeen iron pieces and many slag pieces were found in the excavation, most of them are nails and one is a plough blade found in Kushana level (Pl. 11). Of the twenty-two copper pieces, four are coins, two are antimony rod and one is an arrowhead.

Beads: All together fifty-one terracotta beads, fourteen glass beads and two stone beads were recovered from the excavation. Of the fifty-one terracotta beads, the majority are arecanut-shaped and a few are melon shaped. There are a number of terracotta balls/sling balls. Three terracotta pendants were also found.

Fourteen glass beads and number of seed beads were found. The glass beads are of blue, black, white, off white, green and golden yellow colours. The seed beads which are again made of glass are mostly made in drawing on Indo-Pacific style and are greenish blue in colour. They

are always found in large numbers together and are very fragile (Pl. 12).

Of the two stone beads, one is carnelian and the other is unidentified. There was no evidence of beads in the NBP period, perhaps because it was exposed only in one quadrant of OB1 trench.

Bangles: Of the thirty-nine bangle pieces, twenty-seven are made of glass and rest are terracotta with generally roundish and exceptionally flattish rectangular in section. Altogether twenty-seven glass bangle pieces, mostly blue, green and black were found. Some of them are decorated with grooved strokes on the outer side. There are no bangles found in the NBP level.

Glass: Though glass was found in both localities, Locality II seems to have been associated with glass manufacturing because of the finding of hundreds of glass chunks and debitage of glass production. However, excavation in this locality was very limited this season. The most interesting findings were of materials associated with glass production in Locality I, which confirms that both the localities were of same time period.

Other Antiquities: Some of the other important antiquities found in the site were: A number of votive lamps, terracotta pestles and wheels, ear studs (Pl. 13), miniature pots, pestles, and bone points (Pl. 14) and hairpins (Pl. 15) were found in Sunga Kushan level. Two broken agate bowls - one at Locality I in Trench AY1 layer 3 (Pl. 16) and another at Locality II in Trench ATX8 require closer look.

Remarks

The finds in the habitational area include not only a number of glass beads and bangles but also a several crucible pieces (Pl. 17), glass chunks and other evidences relating to glass production (Pl. 18). This makes us believe that the people related to the glass production area to the north of main area were none other than the people residing in the main area in Locality I. Besides, the glass pieces were found in layers 10 and 11 also, indicating that glass was being produced here from the NBP period. Glass and its items are under scientific analysis to find out the nature of the raw material used, its chemical composition, and to see whether its production was an indigenous development or technology brought from outside. We are also looking at the colour composition and the furnace style.

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Fig. 1: Contour map of Kopia, Dist. Sant Kabir Nagar

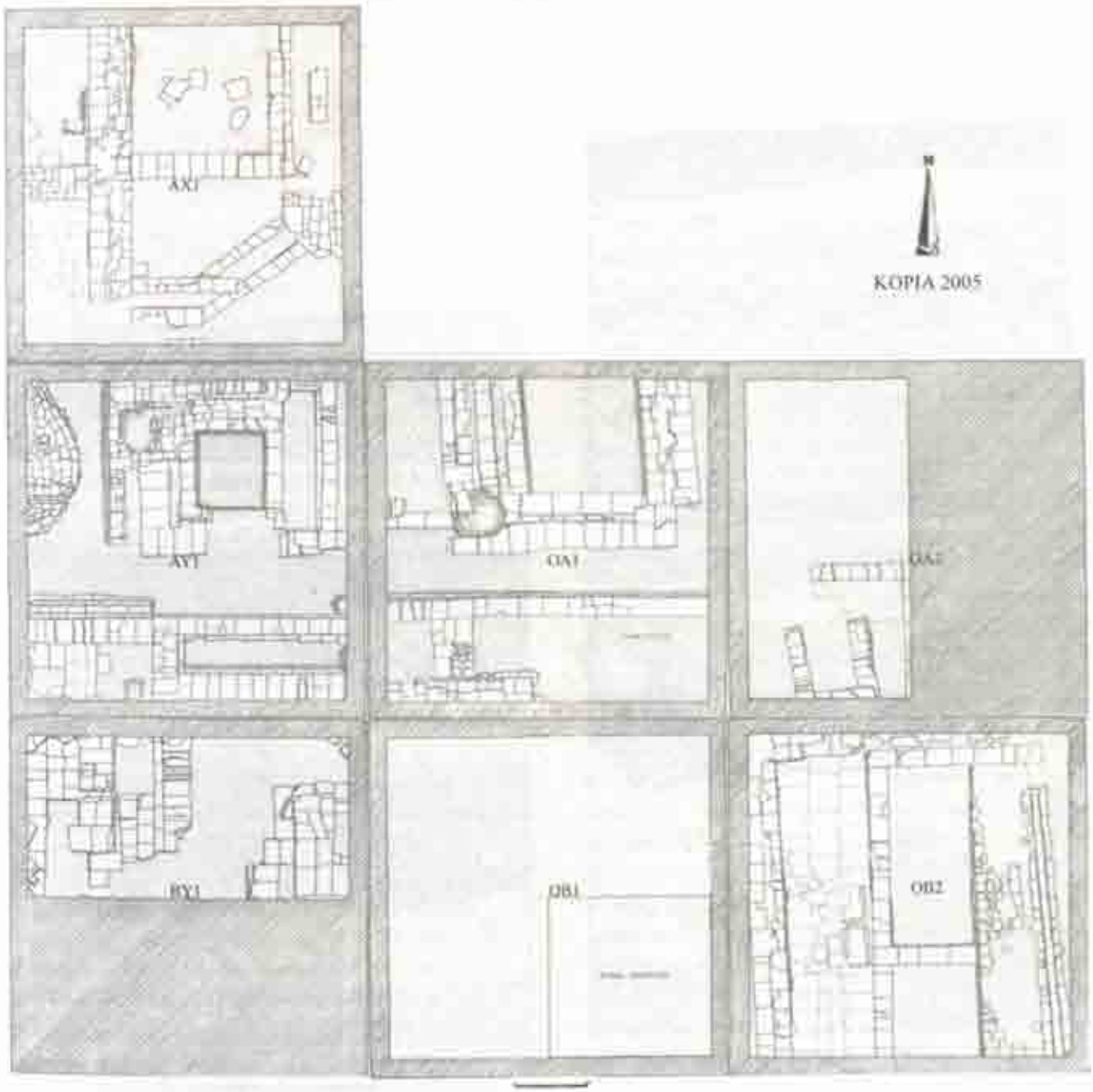


Fig. 2: Line drawings of structures at locality 1

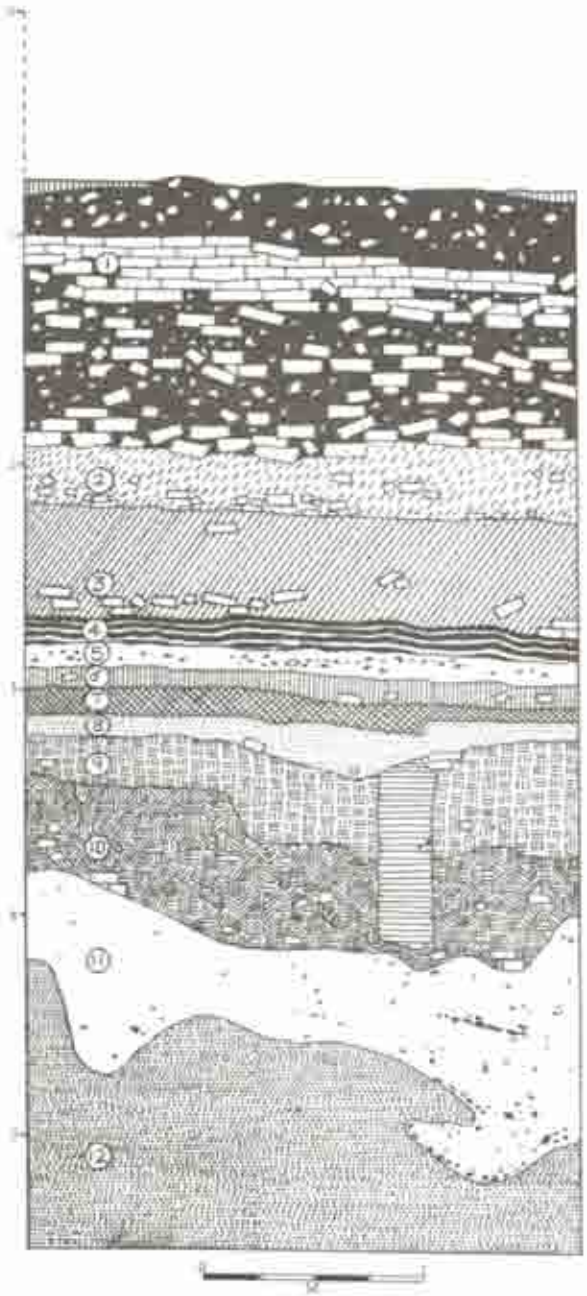
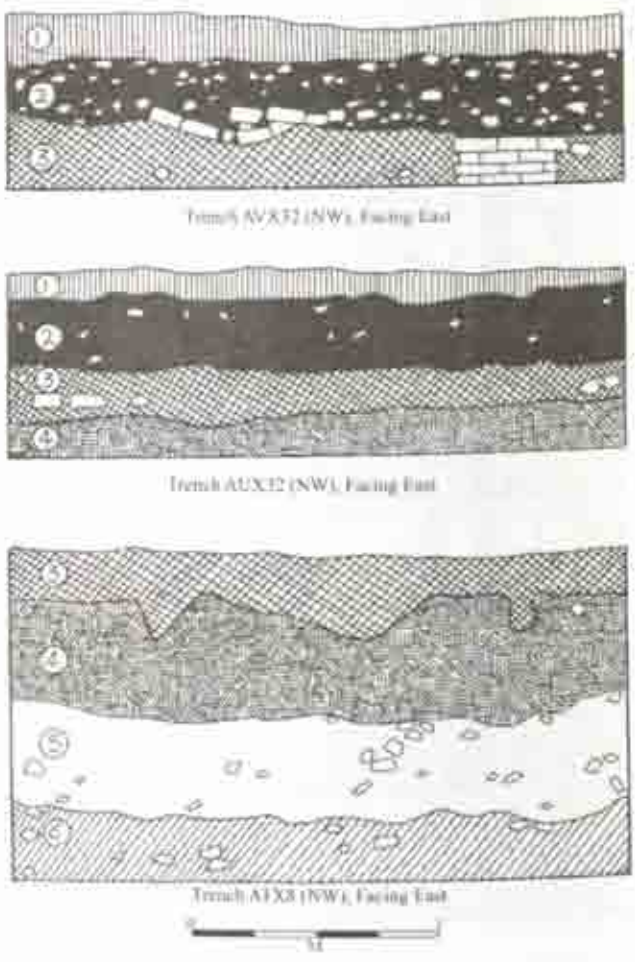


Fig. 3: Stratigraphy at SE quadrant of OB1



Trench AVX32 (NW), Facing East

Trench AUX32 (NW), Facing East

Trench AVX8 (NW), Facing East

Fig. 4: Stratigraphy in various trenches in at locality II

A Stylo-Chrono Appraisal of Pitalkhora Sculptures

AJIT KUMAR*

Pitalkhora (20°20' N; 75° E) in Kannad Taluka of Aurangabad District, Maharashtra has a group of 13 Hinayana Buddhist caves. These are cut in two groups across a ravine. Group 1 on the right side has nine excavations, of which, cave 3, a *chaitya* hall, and cave 4, a *vihara*, are artistically and architecturally important. To the left of the ravine are four small *chaitya* halls.

These caves were first reported by John Wilson in 1853 (Wilson 1853: 357-60). Subsequently, a detailed architectural assessment of these caves was presented by Burgess and Fergusson in their magnum opus, *Cave Temples of India* (1880: 242-46). However, the true artistic and architectural merit of these caves were only brought out in 1957-58 during a debris clearance work undertaken by the Archaeological Survey of India under the stewardship of M.N. Deshpande. This operation, apart from revealing the novel architectural design of cave 3 and 4 also brought forth a rich cache of sculptures both loose and *in situ* which are otherwise very limited in early Buddhist caves of Western India (IAR-57-58:65).

The sculptures discovered at Pitalkhora were first assessed by M.N. Deshpande and subsequently by Vidya Dehejia. While Deshpande presented an overall assessment of the sculptures, Dehejia dealt briefly on their style. While deducing the dates for these sculptures, both these scholars and many who followed them appear to have undermined the stylistic factor of the sculptures and emphasised unduly on palaeography. As the comparative indexes used by scholars for palaeographic assessment were different, the dates offered for same epigraphs varied between 2nd c. BC and 1st c. BC (Deshpande 1959: 66-93 and 1962: 16-28; Dehejia 1972: 46-47, 118-123). This clearly reveals the futility of palaeography as a tool in deducing an absolute date for undated epigraphs and sculptures related with them.

Sculptures should be dated relying on their style rather than external parameters. A stylo-chronological index can be evolved, if, alongwith palaeography, some other parameters like architectural style, epigraphical contents, etc., are employed. This style index can be judiciously used as a comparative parameter to sequence and date sculptures within a site or other contemporary cave sites in Western Indian caves. This same index can be judiciously extended on a wider landscape to other contemporary Buddhist sites as well. Such comparative extension is based on the fact that nearly all early historic Buddhist sites were in constant touch with each other by the movements of clergy, traders, craftsmen, pilgrims, *et al.* and hence shared generic

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similarities in motifs, ornaments and style during a given period (Dehejia: 145). An attempt has been made in this paper to analyse some of the prominent sculptural relics from Pitalkhora to account their style and date and extend the same for sequencing some other major sites in Western India and North India.

An exhaustive analysis of the whole gamut of sculptures from Pitalkhora reveal that they all belong to the early Hinayana period. Sculptures from this period can be broadly divided into two sub periods, Period I-a and Period I-b. Sculptures of Period I-a at Pitalkhora are of unknown artisans and represent an early activity which is shallow in relief and bears a novice characteristic in treatment and form. The sculptures of Period I-b, are largely attributable to Kanha, a goldsmith by profession hailing from Dhenukataka and his apprentices. These sculptures are in high relief and also in the round with a well defined concept of volume and naturalistic treatment of contours.

The sculptures of Period I-a representing the incipient stages of evolution come from cave 3 and they include images of winged horses and load-bearing dwarf *yakshas* on the banisters, the standing armed doorkeepers, and pilasters with *mithuna* and winged creatures on them.

The *yakshas* and horses carved on the banisters of cave 3 are probably the earliest from Period I-a (Fig. 1: A and Deshpande Pl. XLIX.A). They are carved in very shallow two dimensional planes. The figures tend to flatten out rather than present itself in depth and form. The feet are placed sideways. Fingers are stumpy and not clearly demarcated. The human forms are depicted frontally and animals in profile. The broad-winged horse and the *yaksha* figures in their cherubic smile, fleshy physiognomy and treatment are similar to the figures in Bhaja cave 22.

The large-armed doorkeeper image, found from the debris, probably formed part of doorjamb of cave 3 (Fig. 1:B) and Deshpande: Pl. LVII.A). This image is rather queer in style and craftsmanship. The head of the image and its details are carved in high relief and roundness almost in three dimensional forms. The face has a fair amount of naturalism and sensitivity. The body, however, is carved frontally, in two dimensional, shrivelled, flat and constricted forms clinging on to the rock jamb on which it is carved. The overall organic unity between the different parts is inadequate, resulting in an angular and non-rhythmical movement of the contour. The tendency to elaborate the decorations on the surface of the costume, coiffure and jewellery is evident. The triple foiled or fleur-de-lis armlet is common to *yaksha* figures and doorkeeper *yakshas* during both phases. Similar ornament is also worn by figures in Bhaja cave 22. Subsequent to Period I-b, this ornament is not seen elsewhere in Western Indian sculptures. Improper planning and the limitation of space on the jamb where the image is carved may also be one of the reasons for such treatment (Kumar 2004: 94). This figure was also probably painted.

The most developed sculptures of Period I-a are the *mithuna* figures on the pilasters that appear to have adorned the plinth of cave 3 (Fig. 1: C, F; Deshpande: Pl. LX, LXI, and LXII). These *mithunas* are carved within small niches on the pilaster. They have no explicit erotic overtones and stand next to each other in an affectionate embrace. The human figures are in full stature. Though frontal, the rigidity is fading and some gait or freedom of movement is induced into the human forms. Some of the men are engaged in having an amorous fling and are depicted plucking the women on their lips or bosom or drawing them close by pulling their hands.

The physiognomy of men is natural and frontal. The legs are depicted sideward or in same direction. The coiffure of men has a bun-shaped protuberance. The lower garment of men and women is generally a dhoti, worn in the '*kachha*' style that parts below the knee to either side and to the left side near the knee creates a fish tail design. The hems of the garment are detailed by lines. They wear ear-reels, necklaces, armlets and wristlets. The trefoil or fleur-de-lis armlet is not very frequent. These traits continue in the sculptures of Period I-b. The surface decoration of the ornaments compared to Bhaja is considerable reduced. Compared to Bhaja, the human forms show better articulation of their physiognomy, roundedness and flow

in its contours.

The women have an hourglass physiognomy. They have their hair tied in a loose bundle and the head is draped with a shawl that has embroidered sides. This coiffure in all its details is similar to those observable in the paintings of cave 10 at Ajanta and sculptures of Kondane (Ghosh 1967: Pl.I and Debejia: Pl. 31). They wear two necklaces: one flat, broad and closely hugging the neck, and the other of stringed beads slightly longer, falling between the bosoms and extending up to the belly. They wear usual ornaments like armlets, wristlets, girdles and anklets.

The *mithuna* figures of Pitalkhora show a stylistic advancement in its scheme and presentation compared to Bhaja cave 12. At Bhaja, they are depicted waist above in a very strictly frontal posture, heavily ornamented and with large hairdos. At Pitalkhora, such elaborateness has been slightly curtailed and there appears to be a shift toward achieving technical perfection in rendering human body with organic unity, depth and form. Stylistically, these figures are yet to attain the technical perfection of sculptures in Period I-b and those at Kondane but compare well with the sculptures form Bodhgaya (Fig. 2: B and C).

Sculptures of Period I-b at Pitalkhora can be attributed to master craftsman Kanha and his apprentices. He is probably responsible for planning and designing the work of cave 4 with all its sculptural embellishments. Some of the other loose sculptural works like the in-the-round dwarf *yaksha* image, panels of *yakshi* with a dwarf *yaksha*, a female armed doorkeeper, and panel of royal couple can also be attributed them.

The in-situ sculptural embellishments on the plinth of cave 4 include the row of almost life-sized elephants and *mahouts*, a large horse denoting the 'Great Departure of Siddharta', a seated lady behind the horse on the extreme right, armed doorkeepers flanking the doorway, the Gaja-Lakshmi panel above the lintel and the capitals of pillars in the interior. All except the doorkeepers and the pillar capitals are in utterly ruinous condition. Among these sculptural works, the large horse panel and the dwarf *yaksha* are autographed by Kanha and hence are solely his creations (Deshpande: Pl. I. A&B, LIII A,B,LV A,XLIX B).

The armed doorkeeper *yakshas* are depicted standing with javelin in their hands in a stiff frontal posture (Fig.1:E). These figures divulge a technical refinement over the figures of Period I-a. The body is full of stature, well articulate, proportional and faithfully carved. There is better coordination in the articulation of the joints and there is a smooth flow of contours. The flair for detailing ornaments has been slightly reduced and the figure is carved in quite high relief. The feet come to be placed frontally in a naturalistic manner. The headdress is similar to the male figures in the *mithuna* panel. The hair is tied into a round knot along with a scarf and a fold of the hair project out in the centre. Similar coiffure is noticed in the painting of cave 10 at Ajanta. The drapery is almost in the style of the *mithuna* males. The waist band with its leafy dropping are however similar to those worn by the attendant figure accompanying Sakka in the Kulavaka Jataka panel in cave 22 at Bhaja (Kumar: 66).

The dwarf *yaksha* retrieved from Pitalkhora is probably the only in-the-round figure from early Buddhist caves of Western India. It measures nearly one meter in height. It is broken below the knees and the left arm is missing. Over the right arm is an autographed record of Kanha. This figure carries a shallow trough over its head. The body is fleshy and supple. The face is cherubic with a pleasant smile exposing his teeth. The dignified realism brought out in the figures makes it one of the most imperative sculptures from the period (Fig.1: D).

The other specimens apparently crafted by Kanha, be it the seated lady near the horse panel, the *dvarapalas* flanking the doorway of cave 4 or the dwarf *yaksha*, a special emphasis has been given to carve the structure of human body faithfully. The contours are impressive and smooth. The cherubic smiling expression on the faces of these figures makes them aesthetically lively and visually appealing. Stylistically, they are close to the sculptures of Bodhgaya and Kondane crafted by Balaka, the disciple of Kanha (Fig.2: B and C and Fig.1: G).

In stylistic and technical parlance it has already been rightly pointed out by Dehejia that the sculptures from Pitalkhora match those of Bodhgaya (Dehejia: 122). Bodhgaya, in the stylistic development of north Indian art centres, can be placed midway between those of Bharhut and Sanchi. Sculptures in all these sites as in Western India do not carry epigraphs dated in known eras and hence their dating has largely been based on palaeographic and historical considerations.

The only art centre in north India during the early period defying this tradition is the Mathura school of art. There are a good number of sculptures here, which bear epigraphs dated in known eras like the Vikram and Saka. Sculptures bearing absolute date bearing epigraphs can act as style datum, which by means of judicious comparative and analytical assessments can be extended to gauge sculptures from other contemporary art centres for their chronological or stylistic sequencing.

One of the earliest and rather well known sculptural stele from Mathura carrying a dated epigraph is the Amohini panel, now housed in Lucknow museum (Fig.2: A). This stele depicts a lady with her attendants proceeding for prayers. The main scheme is enclosed in a frame comprising of a railing design at the bottom, a pair of pilasters on either sides supporting an architrave above. The railing design is simple and plain as noticed in all early sites. The pilasters are of the pot-base-pot-capital type. The pot base is placed over a pyramidal tire and issuing out of it is an octagonal shaft bearing a pot capital with a couchant sphinx like creature and a second splayed capital above it supporting the architrave. From within the architrave, suspended into the panel are floral wreaths. On the architrave is an inscription belonging to the time of Satrapa King Sodasa and dated to Vikrama year 72=AD 14. A host of scholars vouch that the sculptural style is in harmony with the date ascribed in the inscription and hence this stele can be treated as a stylistic bench mark (Bachoffer 1931:45 Pl.72; Dehejia: 38).

A stylistic comparison of this sculpture with those from other contemporary early Buddhist sites in north India is inevitable. A comparison between the Amohini panel and those on the pillars at Bodhgaya brings forth an indisputable similarity in technique, style and composition (Fig. 2). Panels at both the sites are framed by stylistically similar components at the base, sides and top. The festoon falling from the architrave into the panel seems slightly elaborate and extending the whole upper breadth of the panel at Bodhgaya but limited as floral wreaths at Mathura. The treatment of human contours, the depth, the treatment of the plains the basic jewellery also has a generic similarity. On the elaborateness of some decorative elements and comparative primitiveness and simplicity in dealing human forms Bodhgaya can be considered slightly earlier to the Amohini panel but not more than a few years appear to separate the two or it may even be contemporaneous. This will necessitate placing Bodhgaya sculptures earlier than Amohini panel, somewhere between AD 4 and 14. The sculptural style of Bodhgaya figures has been accepted by a host of scholars to lay midway between those of Barhut and Sanchi Stupa-I (Bachhofer 30; Marshall et al. 1935/ 36:106 and Chakravarty 1997:53). Though the style of Sanchi Stupa- I is developed over that of Bodhgaya and Amohini panel, they appear to be chronologically not very distant from each other. Stylistically Sanchi sculptures can be placed to a period following the Amohini panel somewhere between AD 15 and AD 25. To validate the date deduced for the Sanchi sculptural style, epigraphic and Puranic records needs to be assessed.

Inscription on the Southern torana of Sanchi Stupa I, attributes its erection to the period of Sri Satakarni, the third ruler of the Satavahana dynasty. Simuka vanquished the last Kanva ruler Susarman who held sway around Vidisa and founded the Satavahana dynasty around 30 BC. Though Satavahanas consolidated power in Western Maharashtra and Deccan they also apparently held sway over Vidisa till the time of Sri Satakarni as evidenced from his epigraph at Sanchi. Simuka (30 – 7 BC) and his successor Krishna (7 BC – 11 AD) together ruled for 41(23+18) years according to Puranic sources (Sircar 1951:195; Raychaudhuri 1923: 357-58 and Chattopadhyaya 1974:37). In that case Sri Satakarni should have ascended the throne slightly earlier or close to 15 AD and ruled for 18 years, which is

harmonious with the sculptural style of southern torana of Sanchi Stupa I and the date deduced for it. As many epigraphs of early Satavahana rulers are found in Western India we shall for cross-checking the dates deduced for Sanchi sculptures examine the evidences from Western Indian caves.

Epigraphic evidences from Nasik cave 19 indicate that it belongs to the times of Krishna the second king of the Satavahana dynasty (Luder: 1144). This architecturally simple vihara comprises of a pillared veranda and an astylar hall with cells cut into its side walls. The pillars of the veranda are square in plan with arises chamfered off. Stylistically similar pillars are also observed in Pitalkhora cave 4 and Kondane cave 2 to which they are apparently coeval. In other words, Pitalkhora caves may also correspond to the reign period of Krishna which as divulged from other sources may be placed as stated above between 7 BC and 11 AD.

As already stated, Pitalkhora sculptures of Period I-a initially show some affinity with Bhaja sculptures. The most developed sculptures within the same period like the *mithuna* figures bear affinity with those from Bodhgaya panels in the technical treatment of the human physiognomy, delineation, coiffure costumes and a commonality of themes and motifs. Stylistically, sculptures of Period I-a, appears to be earlier than Bodhgaya sculptures, for which a date between AD 4 and AD 14 is deduced. However, not more than a decade can separates the artistic activity within the two sites and Pitalkhora Period I-a appears to date between 5 BC and AD 6.

During Period I-b, the sculptures carved by artisan Kanha his apprentices Balaka and others, continue to bear some of the traits of Period I-a in their costumes and ornaments. However, the human body rendered by Kanha are technically and anatomically superior. Human figures are brought out in high relief from a darker background with anatomical accuracy, visual appeal, sensuousness and sway in forms. The style reflected in Period I-b at Pitalkhora and Kondane in may ways reflect the style and calibre of individual artist Kanha rather than the style of the period. The period style is evident in the embellishing factors, costume, coiffure, and ornaments that divulge the continuity between periods. The motifs of Period I-b, in their technical treatment, form, composition, execution of human physiognomy and embellishing factors are equitable with those of Bodhgaya and may be with restraints even to sculptures of Sanchi with which they share some technical affinity. Other artistic accessories like the treatment and style of ornaments, coiffure and costumes make sculptures of Sanchi Stupa- I torana later than Period I-b and possibly closer to Bedsa-Karla sculptures. This necessitates sculptures of Period I-b to be placed slightly earlier than those of Sanchi which we have deduced a date of AD 15-AD 25. Presuming a large time gap do not separate sculptures of Pitalkhora I-b and those of Bedsa-Karla-Sanchi a date between AD 6 and AD 14 seems appropriate for sculptures of Period I-b at Pitalkhora.

In conclusion it can be stated that, Pitalkhora sculptures which belongs to the Hinayana period, on stylistic basis can be divided in two sub periods namely Period I-a and Period I-b. The artisans of Period I-a are unknown and those of I-b are attributable to Kanha and his apprentices Balaka and others. While sculptures of Period I-a, reflect certain primitiveness in technique and form, Period I-b reflects an advanced style and may be attributed to the individual calibre and style of artist Kanha and his apprentices. The commonality noticed in style of coiffure, costumes and ornaments within these two sub-Periods rules out a large time gap between the two. Assessing stylistic, palaeographic/epigraphic, and literary evidences, Pitalkhora Period I-a may be placed to 5 BC - AD 6 and Period I-b between AD 6 - 14. These sub periods are apparently contemporaneous with the reign period Krishna, the second Satavahana ruler. Stylistically the sculptural periods at Pitalkhora can be placed midway between sculptures at Bhaja and Kondane-Bedsa-Karla in Western India and Bodhgaya -Mathura (Amohini)-Sanchi among the North Indian sites. Bhaja with its stylistically nascent figures (cave 22 back wall) will have to be dated earlier than Period I-a somewhere between 15-5 BC and Bedsa-

Karla with its refined style comparable to Sanchi, are later than Phase I-b somewhere between AD 15 - 25.

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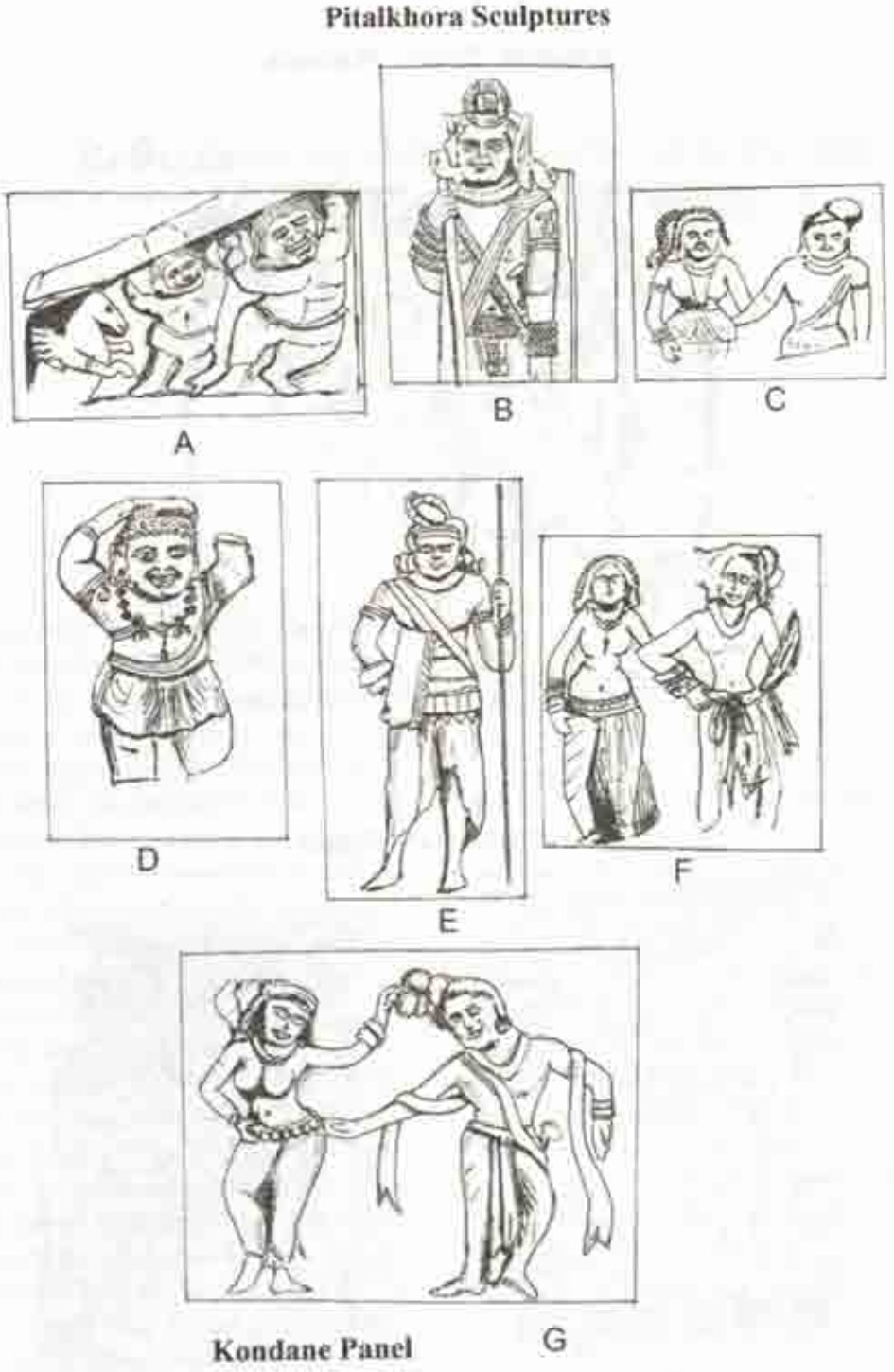


Fig.1: Pitalkhora sculptures (A-F) & Kondane Panel (G)

Amohini Panel - Mathura



A

Bodhgaya Panels



B



C

Fig.2: Amohini Panel, Mathura (A) & Bodhgaya Panels (B & C)

Reflections on the Shikharas of Kalachuri Period Temples in Eastern Madhya Pradesh

A.K. Singh*

Introduction

The Kalachuris (600-1600 AD), a ruling dynasty in Central India, were munificent patrons of art and literature and great builders of magnificent edifices. Prior explorations conducted in the eastern Madhya Pradesh (Central India) have yielded antiquarian remains of the Kalachuri period, which stand testimony to this notion. The vast repertoire of these remains includes temples, monasteries, reservoirs and *vyakhyanashalas* in addition to other architectural achievements. Earlier the ensemble of architectural remains were reported from less than twenty sites; but now, as a result of two decades of explorations conducted by us, these have been raised to forty (Fig.1). In fact, these newly discovered monuments constitute the core and basic concern of this article. The exposition of this new material is bound to throw a new light on the heyday of the Kalachuri rule, which has eluded the scholars so far. An endeavour is being made here to discuss the salient features of the Kalachuri period temples of the *Chedi* country with some emphasis on the *shikharas*. These temples are influenced by Orissan style (700-1300 AD), Pratihara style (800-900 AD), and Khajurabo style (900-1200 AD); thus, encapsulating features of different regional styles of temple architecture of north India. This study is attempting to understand the intermingling of architectural features derived from various schools of art.

Historical Information on the Kalachuris of Tripuri

The Kalachuris, also known as *Katachuri, Katachchhuri, Kalatsuri, Haihaya* and *Ahihaya*, ruled from about mid-sixth century AD with varying fortunes in different parts of the country, for more than 1200 years (Sharma 1980). Being masters of the Chedi country, they also became famous as *Chedi, Chaidya* or *Chedikula*. Before coming to Tripuri (Tewar, Jabalpur in eastern Madhya Pradesh), they settled in Mahishmati (Mandhata or Maheshwara, Madhya Pradesh). The Kalachuris of Malwa and Gujarat had their capitals at Mahishmati and Anandpur; whereas Dahala house had their capital at Tripuri. The Kalachuris of South Kosala had their capitals at Tummana and Ratanpura; and the Kalachuris of Kalyana had their capital at Sharayupara. Of all these, the Tripuri house held sway over an extensive empire subsequently to be called as *Chedimandala* or *Dahalamandala*. Pargiter observes, "Chedi lies along the south bank of the river Yamuna, from Chambal on the northwest to Karvi on the south-east." Later, Chedi came to signify the modern

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province of the Baghelakhanda in eastern Madhya Pradesh (Mirashi 1955). Today, the Baghelakhanda comprises of a fairly large area, including districts like Rewa, Sidhi, Satna, Shahdol and Umariya.

The first known ruler of the early Kalachuri dynasty who founded the empire with its capital at Mahishmati is Krishnaraja (675-700 AD). Subsequently, after the downfall of the empire of Harsha in North India, Vamarajadeva seems to have overran Bundelkhanda and Baghelakhanda and established himself at Kalanjara fort in Central India. He ruled over the central portion of Uttar Pradesh in addition to Bundelkhanda, Baghelakhanda, Sagar and Jabalpur. His capital was Tripuri (Mirashi 1955). Shankaragana I (750-775 AD) succeeded Vamarajadeva. It was probably due to him that the temple group of Bandhavgarh hill-fort (Umariya) and Bheraghat near Jabalpur were built. No information, however, is available about the successors of Shankaragana I, until the advent of Lakshmanaraja I (825-85 AD) and Kokalla I (850-890 AD). With the reign of Kokalla I, whose references are available in the Bilhari inscription and the Benares plates of Karna, the Kalachuris came into prominence. He was succeeded by his son, Shankaragana II. He, in turn, was succeeded by Balaharsha (910-915 AD) who was followed by Yuvarajadeva I Keyuravarsha (915-945 AD). Nohalla, wife of Yuvarajadeva I, was a Chalukyan princess, who ordered to build the Shiva temple at Nohata (Damoh). Yuvarajadeva I assumed the titles of *chakravartin* and *trikalingadhipati* and is credited to have built *golakimatha* (Bheraghat, Jabalpur) and some other temples and monasteries. Yuvarajadeva I invited Prabhavashiva, a *mattamayura* pontiff, from Madhumati. A Shaiva monastery and a temple were built for him. Probably, the monastery at Chandrehe was also built by him. Gollaka, one of his ministers, ordered to build the carved colossal images of the *kurma* (tortoise), *matsya* (fish), *varaha* (boar) and *Haladhara* (Balarama) at the Bandhavgarh fort.

Lakshmanaraja II (945-970 AD), son and successor of Yuvarajadeva I, was a devout Shaivaite. He invited a Shaiva pontiff, Hridayashiva, and donated him the monastery of Vaidyanatha or Nohalleshwara. Another monastery (a Shiva temple) was constructed by Prashantashiva at Gurgi, in which images of Uma, Uma-Maheshwara, Karttikeya, Ganapati and Saraswati were installed. Prashantashiva also built one *matha* at Varanasi and another one, identified as Shiva temple of Chandrehe, on the banks of river Son. The Karitalai stone inscription states of a highly erudite and pious minister of Lakshmanaraja II named Bhatta Someshwara, who built a temple of *Varaha-Vishnu* at Karitalai with the name *Somasvami*. Several villages were donated for the maintenance of this temple.

Kokalla II (990-1015 AD), the successor of Lakshmanaraja II, was an able young ruler who restored the glory of his family. He defeated the Chalukyan king Kuntala and also subjugated the Pala king Mahipala I. Kokalla II was followed by Gangeyadeva (1015-1041 AD), who was one of the most illustrious rulers of the dynasty. The Bheraghat stone inscription of Narasimha states that he caused to build a *meru* type of temple dedicated to Lord Shiva and struck coins in gold, silver and copper. Gangeyadeva was succeeded by his son Karna (1041-1073 AD), a warrior and an able administrator. The Rewa stone inscription mentions of his conquest of the 'eastern country.' He built a magnificent temple called Karnameru at Varanasi and a *ghat* called Karnatirtha at Prayag. A settlement called Brahmana-Karnavati was established near Tripuri. The triple Shaiva shrine at Amarakantaka is also attributed to him.

Karna was succeeded by Yashakarna (1073-1123 AD), who in turn was succeeded by his son Gayakarna (1123-1153 AD). A Shiva temple by *Pashupata Shaivacharya* Bhavabrahman and another temple of *Shantinatha* by Mahabhoja was constructed around this time. Narasimha (1153-1163 AD) succeeded his father Gayakarna. Kirtishiva, a disciple of Shaktishiva, was his spiritual preceptor. Three inscriptions of his reign have been discovered. The one at Bheraghat records the construction of a Shiva temple called *Vaidyanatha*, a monastery, a hall of study and a row of gardens. The second inscription from the Lal Pahad near Bharhut states the construction of a *vaha* (water channel) and the third near

the fort of Alhaghata registers the construction of a temple of Ambika and a *ghata* by Ranaka Chhihula (Mirashi 1955). Jayasimha, the younger brother of Narasimha, succeeded him sometime between 1159 AD and 1166 AD. Vimalashiva was his spiritual preceptor who ordered to build a Shiva temple. Three villages were endowed for the upkeep of this temple. Tewar and Karanbel inscriptions also refer to the construction of Shiva temple during his reign. He was succeeded by Vijayasimha, who was forced to pay homage to the Chandella King Parmardin. Trailokyamalla was the last known ruler of the dynasty of Kalachuris of Tripuri, least is known about him.

Chronological Sequence of the Temples

Banerji classifies the Kalachuri monuments of the Chedi country into three broad groups. He places the ruins from Gurgi, Chandrehe, Bilhari, Bheraghat and Chhoti Deori in the first group; Sohagpur, Amarakantaka, Baijanatha and Marari are placed in the second group; and the third group consists of ruins of Bheraghat and Deotalava. This was the period of decadence (Banerji 1931). Krishna Deva, on the other hand, classifies the Bandhavgarh group of temples (Umariya) as the earliest (700-800 AD), followed by the Baijanatha temple (Bela, Satna) which is datable to 900 AD. The remains at Arjula, Chandrehe, Gurgi, Mahasaur, Khajuha, Maihar, Nohta, Tewar, Bilhari, and Marai have been dated to 1000 AD; whereas the temples of Sohagpur and Amarakantaka (Shahdol) have been assigned to 1100 AD (Krishna Deva 1995). But with the new data available, a good deal of monuments and sculptures have been added to the corpus. Hence, the classification put forth by Banerji and Krishna Deva needs fresh interpretation.

It seems that the temple building activity under the Kalachuris in eastern Madhya Pradesh commenced with the partly preserved monolithic temple at Mada and the Boudha Danda temple in Sidhi (600-700 AD) (Pl. 1), followed by the Sitamadhi group of temples in Shahdol (8th century AD) (Pl. 2); this constitutes the first phase. The Bandhavgarh group of temples (Umariya) (Pl. 3), Bela (Satna) and Deour Kothar temple (Rewa) were erected in succession. In the second phase (11th century AD), Arjula, Gurgi, Mahasaun (Pl. 4), Chandrehe, Khajuha, Maihar (Pl. 5), Nohta, Tewar, Bilhari, Marai, Patiandai, Kunwara Matha (Pl. 6), Manpur (Pl. 7), Rehi and Baghedi temples took form. Sohagpur (Pl. 8), Amarakantaka (Pl. 9), Lilaha (Pl. 10) and Chunari (Singh, A.K. 2002) are the temples and monastery of the third phase (12th century AD). The temple of Deo Talav (Pl. 11) represents the decadent phase of the late Kalachuris (1200-1300 AD), (Singh 2002). Thus, the antiquity of the temple building activity, at least in the eastern Madhya Pradesh shall go back to circa 600-700 AD.

Some of the temples cited above were discovered recently and hence the scholarly world knows very little about them. Moreover, since they bear no epigraphic evidence, it becomes a difficult task to assign them any period. I have ventured to assign them to the Kalachuri period, but the surmise is purely based upon the circumstantial evidences and stylistic considerations, but the issue is still open for discussion. The only great royal dynasty that could have financed such a magnificent work of art in that region would have been the Kalachuris. This conjecture is supported by Mirashi's and Burgess' inferences. Mirashi had inferred that the Elephanta caves were excavated in the second half of the 6th c. AD while Burgess had placed them at around 800 AD (Fergusson and Burgess 1880). Against this is Hirananda Sastri's opinion, who places the construction of Elephanta in the Gupta period. Since the Kalachuris are supposed to have excavated the rock cut temples at Elephanta, the excavation of monolithic temples at Mada also could be ascribed to them in the same period, i.e., around 600 AD. Further, the cave temple was carved under the influence of the *pashupatas* (a sect of Saivism), and Kalachuris themselves were followers of the same sect. Thus, we can safely assume that the Mada temple was constructed under the aegis of the Kalachuris.

The Kalachuris of Sharayupara had *nandi* as their emblem on their seals whereas the Kalachuris of Tripuri had adopted the *Gaja-Lakshmi* as their distinctive emblem (Mirashi 1955). Incidentally, the *lalatabimba* of the

Boudha Danda temple, which lies in the vicinity of Mada temple is embellished with the image of the same *Gaja-Lakshmi*. The Boudha Danda temple seems to be of the same period as the Shiva temple of Tala, Bilaspur (575-600 AD) and the Rajiv Lochan temple of Rajim, Raipur (600 AD) in south Kosala (Krishna Deva 1995). Delineation of the *chaitya* dormers over the *varandika* and *madhya-lata* of Boudha Danda and Rajiv Lochan temple is alike. The *karna-rathas* also bear resemblances. The *shikhara* of Dhobini temple at Bilaspur (700-725 AD) is also identical, giving rise to the speculation that possibly the Boudha Danda *shikhara* style was in vogue in 600-800 AD. Till recently, only the Bandhavgarh group of temples (700-800 AD) were the earliest known temples and sculptures from this part of the region. Now the typical rendering of sculptures of Ganesha, Surya and Parvati at Boudha Danda suggests an earlier date to it in comparison to Bandhavgarh. The Sitamadhi group of temples are identical, particularly in architectural delineation, albeit with some degree of advancement, to the Boudha Danda temple. The *chaitya* dormers over the *shikhara* and dimensions of both these temples closely resemble. Hence, these monuments could be cognate.

Noteworthy Architectural Features

In ground plan, the temples of the Kalachuri period consist of *garbhagriha*, *antarala* and *mandapa*. The *garbhagriha* is generally either square or rectangular in plan, except at Mahsaun and Chandrehe, where these are circular. The Mahsaun temple seems to be the predecessor of Chandrehe. Both these temples are *nirandhara*, but no other example of this type of temples has yet been reported from the region. Further, the only hypaethral shrine reported so far is the Chausatha Yogini temple from Jabalpur. One unique phenomenon, noticed in the temples of Pataleshvara (Amarakantaka, Shahdol) and Baghedi (Rewa), is the lowered floor level of sanctum. One may reach to the presiding deities installed in these temples through a set of stairs leading downwards. Invariably, the *sanctum sanctorum*, is either vacant or enshrined with a *linga*, except in the *Keshavanarayana* temple (Amarakantaka) and *Jwalamukhi* temple (Maipur, Umariya), which were enshrined with an image of Vishnu. The ceiling, often adorned with a full blossomed lotus, is either of *samatala vitana* (flat ceiling) or *nabhichchhanda* (with deep concentric cusped-and-coffered courses) type. Occasionally, the ceiling may be pyramidal in shape as found in the Deour Kothar (Rewa) and Khokhala (Satna) temples.

The sanctum is preceded by plain or ornate doorjambs of *tri*, *panch* or *sapta shakhas* and the lintel may hold images of the *trinity*, *navagrahas* and *saptamatrikas*. The *lalatabimba* is provided with many of the manifestations of the presiding deity. Interestingly, the *lalatabimba* of Boudha Danda temple is adorned with seated Gaja-Lakshmi flanked by elephants on either side pouring water with two vessels. The only other instance of this type is known from the Kolhu Diha temple (Sidhi).

The *antarala*, flanked by pilasters, is generally rectangular in plan. These pilasters are ornamented by the vase and foliage motif. The *mandapas* of the temples have seldom survived. If preserved, these are seen to be supported by pillars and pilasters and are open from three sides except for the temples at Chandrehe, Sohagpur, Amarakantaka and Siddhanatha, (Pl. 12) where lateral transepts are provided. A canopy of the *Kuta achhadyas* also is provided on three sides. Porches of the monasteries at Chandrehe and Chunari too are with the corrugated *kuta achhadyas*. The Nohta temple is exceptional in having a *rangamandapa* in addition to the mandapa.

The early phase temples are erected on a low *jagati* (Bandhavgarh, Boudha Danda, Sitamadhi) and the evolved temples of later phase rise from a high *jagati* (Chandrehe, Sohagpur, Amarakantaka). Temples like Chandrehe and Sohagpur are provided with the *peetha* and *jadya kumbha*. At Sitamadhi and Amarakantaka (*Triayatana* temple), three temples have been erected on the same platform. All the temples of the period are *nirandhara* and in elevation, these consist of the *vedibandha*, *jangha*, *varandika* and *shikhara*. The *khura*, *kumbha*, *kalasha* and *kapotapali* are usual members of the *vedibandha*, but in some temples the *khura* is conspicuous with its absence.

Sometimes, the recess between the *kalasha* and *kapotapali* is relieved with the *antarpatta*, and *kapotapali* is surmounted by perforated diamonds. At Boudha Danda and Sitamadhi, the recess between the *kalasha* and *kapotapali* has relief motifs of *tula-peetha*, a reminiscence of the Pratihara idiom. In the Pratihara period temples of central India, the same motif occurs at the *kapotika* (Trivedi 1990). The *vedibandha* subsequently gives rise to the *jangha*.

A single or double band of foliage divides the *jangha* into two or three unequal registers. The central *bhadra rathas* are flanked by the *prati-rathas* and *karna-rathas*. The *bhadra* nieches (single or pilastered) may be pedimented. The projected blocks alternately arranged with the sunken panels in recesses are carved with *apsaras*, *shardula* and/or with the other secular images. The *janghas* of Deour Kothar, Deoguva and Khokhala are made up of stone slabs. These may terminate into a *ghanta-mala* design with intersecting loops (Bandhavgarh, temple no. 4) or in a *grasa-patti* (Bandhavgarh) or a half festoon (Bela). The *jangha* is surmounted by the *varandika*. It usually comprises of a pair of *kapotapalis* or a few mouldings, intervened by prominent recesses. Sometimes it is relieved of a frieze of the perforated diamonds (Bela). The *shikhara* crowns the temple and its finer details are discussed separately. The rarely preserved pinnacle usually comprises of *amalaka*, *chandrika*, *amalasarika* and finally, the *kalasha* forms the top finial of the temple.

The *Shikharas*

Temples of the Kalachuri period are crowned by the *latina shikhara* of *nagara* style. The *Vallabhi shikharas* are as yet unknown and the *Vrittakara shikharas* also are not common. The only instances of the *Vrittakara shikharas* have come from the temples of Chandrehe (Sidhi) and Mahsaun (Rewa). Both the temples are coeval and cognate. 'The *vrittasamsthanaka* temples should be built *nirandhara*', urges the *Brihatsamhita*. The Kalachuri artisans have followed the same canonical diction and experimented with lavish ornamental schemes.

The Shiva temple of Chandrehe is one of the best-preserved temples of the said period. In plan, it consists of the *garbhagriha*, *antarala* and *mandapa*, whereas the *peetha*, *vedibandha*, *jangha*, *varandika* and *shikhara* are the usual constituents in its elevation. The *shikhara* is formed of a closely set group of *latas* (*rathas*), lavishly relieved by the *chaitya* mesh motif. The *bhumi-amalakas*, however, are conspicuously absent. The subtle, handsome curvature of the *shikhara* fully decorated by *chaitya* filigree is indeed charming (Krishna Deva 1995). All the *rathas* on the *shikhara* reach up to the *amalaka* of pinnacle. The pinnacle comprises of the *amalaka*, *chandrika*, *amalasarika*; and *kalasha*, which is the crowning element on the *shikhara*. The *kapili* terminates into the *sukanasika*, formed of a huge medallion harbouring the triple head of Maheshamurti above an elaborately carved base. Cunningham has stated that the height of the platform on which this temple stands today was raised later (Cunningham 1970), but Banerji seems to disagree with the proposition (Banerji 1931).

The Shiva temple of Mahasaun, in plan, consists of the *garbhagriha*, *antarala* and *mandapa*. In elevation, it comprises of the *vedibandha*, *jangha*, *varandika* and *shikhara*. Its partly preserved *shikhara* and *kapili* are richly embellished with *chaitya* mesh motif. The *shikhara* of the monolithic temple, perched over high hills of the Ganesh Mada is completely lost. But situated in its close vicinity, the temple of Boudha Danda, is one of the few surviving monuments of the early phase of construction in eastern Madhya Pradesh. In plan, it comprises only of a square (cubical in 3-D) *garbhagriha*. Presence of the *mandapa*, however, is merely a conjecture. In elevation, the *vedibandha*, *jangha* and *shikhara* are its principal components. The *shikhara*, however, is partly preserved, and the pinnacle is completely lost. Each *bhumi-amalaka* on the *karna-ratha* comprises of pilasters with stunted capitals. Confines of the two adjacent *bhumis* are demarcated by a continuous row of *chaitya* dormers and the *madhya-lata* also is embellished with *chaitya* dormer motifs (Singh 2002).

The group temples of Sitamadhi (Shahdol) and

Bandhavgarh (Umariya) are of *triratha* type, having *madhya-lata* adorned with the *chaitya* dormers. Their *karna-rathas* are punctuated with the *bhumi-amalakas*, numbering three at Sitamadhi and four at Bandhavgarh. The presence of *ghata-pallava* motif on the *bhumi-amalakas* at Sitamadhi is remarkable. The Bandhavgarh temples manifest the earliest phase of *Chedi* style, opines Krishna Deva (Krishna Deva 1995).

Around 1000 AD (second phase), the temple-building enterprise took a galloping stride and hence a host of temples were erected with a great deal of vigour and enthusiasm. Amongst the temples of this phase, the Baijanatha temple (Bela) is the earliest. Its *latina shikhara* survived till 1921, but the *mandapa* collapsed even before 1883. In the Gola Matha temple (Maihar) the *latina shikhara* is preceded by *kapili*. Its curvilinear *shikhara* is ten-storied with an elegant curvature. The *madhya-lata* and *balapanjara* of this temple are ornamented with *chaitya* mesh arches. The *vemu-kosha* is of nine *bhumis*. Its pinnacle with *amalaka* and *kalasha* is preserved. Likewise, the Shiva temple of Rehi has *pancharatha shikhara* with five storeys. The *madhya-lata* and *balapanjara* are adorned with the *chaitya* mesh. The *vemu-kosha* is profusely ornate and the pinnacle is lost.

The *shikharas* of the Kunwara Matha temple (Jaso), Jwalamukhi temple (Manpur), Shiva temple (Nohta, Damoh) and Chaturmukha Mahadeva temple (Nachna) [Pl. 12] rise with five *rathas*. The *chaitya* dormer is the most favoured motif employed for embellishments in these *shikharas*. Their pinnacle is with the usual members. Only the Jwalamukhi temple enshrines an image of Vishnu in the *sanctum sanctorum*, whereas all other temples are dedicated to Lord Shiva. The Kunwara Matha temple shows later renovations, and its *mandapa* is a later addition. The ambience of Chaturmukha Mahadeva temple, however, suggests derivation of a couple of motifs from the Guptas, Pratiharas and Kalachuris as well. Its madhya-lata and subsidiary shoots are decorated by the *chaitya* filigree and the *karna-ratha* is punctuated by five storeys adorned with the flattened *amalakas* and a *pattika* of perforated diamonds (Krishna Deva, 1995). The *karna-rathas* of Visvanatha temple (Maribag), however, are dotted with ten *bhumi-amalakas* (Ali 1980).

Incidentally, except the Shiva temple at Lilaha (Satna), all the temples of the third phase reported until now are in the present district of Shahdol in Madhya Pradesh. Temples of this phase represent an advanced stage of evolution of temple architecture. The extant remains of these monuments are comparatively better preserved. The *madhya-lata* over the *shikhara* of Lilaha temple is ornamented with the *chaitya* mesh, while the subsidiary *latas* are quite plain, leaving aside the *karna-rathas* dotted with eight *bhumi-amalakas*. Each *bhumi* is provided with an *amalaka* and a *pattika* of the perforated diamonds. The *madhya-lata* touches the *amalaka*, the lowest member of pinnacle, but the other *rathas* are falling short. The *sukanasika* region of the temple has been repaired (Singh 2002).

The Virateshwara temple (Sohagpur), *Triayatana* temple and *Keshavanarayana* temple (Amarakantaka) are the other temples of the third phase. The Virateshwara temple is one of the most resplendent temples erected by the Kalachuris. In its ground plan, the temple consists of a square *garbhagriha*, *antarala* and *mahamandapa* and in elevation the *peetha*, *vedibandha*, *jangha*, *varandika* and *shikhara* are its principal members. Sanctum walls of the temple are projected into seven *rathas* and at the base of *mula-shikhara*, each *ratha* culminates into a corresponding miniature *anga-shikhara*. The *mula-shikhara* on north, south and west is adorned with a miniature *shikhara*. The *madhya-lata* and subsidiary *latas* are plain while the *karna-rathas* are with *bhumis* numbering twenty-one. The pinnacle comprises of *amalaka*, *chandrika*, *amalasarika* and *kalasha*. The *shikhara* of this temple is the only example under the Kalachuris, which is adorned with the *anga-shikharas* - a distinct feature of the Khajuraho group of temples in Central India.

The *Triayatana* temple (Amarakantaka) is a triple-shrined temple erected on a lofty *jagati*. Its *saptaratha shikhara* has twenty-one *bhumi-amalakas*. The Keshavanarayana temple (Amarakantaka), however, is a

double shrined temple with a *shikhara* of the *pancharathas*. The *karna-ratha* of this temple is of thirteen *rathas* whereas the Machchhindranatha temple and Pataleshvara (Amarakantaka) temple are punctuated with eleven *rathas*. The *mandapa* of Keshavanarayana and Machchhindranatha temple are roofed by a pyramidal *shikhara* of receding tiers. Provision of the *kaksasanas* in these *mandapas* is quite similar to that of the Khajuraho group of temples. The *shikhara* of the western shrine of Keshavanarayana temple near its tapering end is adorned with a squatted lion. Similarly, the *sukanasika* of the Machchhindranatha temple is crowned by a *gajakranta simha*, a reminiscence of the Orissan style of architecture, as the leitmotif frequently occurs in those temples. Provision of the *kakshasana* in *mandapa* of Siddhanatha temple (Pl. 13) is also worth mentioning. The temple is profusely ornate, particularly the *makara torana* preceding the *mandapa* is first of its kind being reported from the region. It exhibits a superb and skilled blending of the art motifs, executed with a rare sensitivity derived from the temple architecture of the Kalachuri and Chandella period (Dhaky 1998).

The *garbhagrihas* of Deour Kothar temple (Rewa), Deo Guva and Khokhala temple (Satna) (Pl. 14) and Deourkota temple no. 1 (Semara, Sidhi) are roofed by a pyramidal *shikhara* of receding tiers. This phenomenon is in sharp deviation from the established norm of earlier discussed temples with *latina shikharas* (curvilinear) over the *sanctum sanctorum*.

The Somanatha temple (Deotalava, Rewa), is a monument of the decadent phase of the Kalachuri art and architecture. It has a stunted, unpretentious and *saptaratha shikhara*. Its *madhya-lata* is devoid of ornamentation and the *karna-rathas*, though originally might be seven storeys, seem to have been arranged inadvertently. All the rathas are converging near the *griva*.

Features Shared by Temples Contemporary to the Kalachuri Temples

On the sidelines of defining peculiarities of the *shikharas* of temples of Kalachuri period, the following narration is an attempt in giving the shared peculiarities of contemporary north Indian temples, especially Pratiharas and Chandella with Kalchuri temples.

Motifs employed in the Kalachuri period temples, like the stylistic *ghanta-mala* design (Bandhavgarh, Semara, Naikahai, Singhpur Arjula), *chaitya* pediments (Bela, Bandhavgarh), *udadhikumaras* (Tighara, Nohta, Singhpur Arjula, Bilhari, Kodal), *naga-shakha* and *garuda* at the *lalatabimba* (Semara, Rauhal), *tula-peetha* and *lumax* (Boudha Danda, Sitamadhi) are characteristics of the Pratihara period temples. Some of these might have been derived by the Kalachuris. Similarly, the lateral transepts (Chandrehe, Amarakantaka, Siddhanatha), *makara torana* (Siddhanatha) and *anga-shikhara* (Sohagpur) are key to the Khajuraho (Chandella) group of temples. The festoon of *ardha-padmas* (half lotus), perforated diamonds (Mada, Bela, Lilaha, Chunari), circular plan of *sanctum sanctorum* (Chandrehe, Mahsaun) and the sunken floor of sanctum (Amarakantaka, Baghedi) are possibly typical to the Kalachuris. The festoon of *ardha-padmas* and the decorative design of perforated diamonds at the *varandika* are typical motifs of the Kalachuri style (Krishna Deva 1995).

The squatted lion (Keshavanarayana temple) and *gajakranta simha* (Machchhindranatha temple) are the motifs showing influence of the Orissan style of temple architecture (Krishna Deva 1995). The region is also dotted with Gupta period temples constructed at Bhumara and Nachna but with little influence over the *Chedi* style. The influence which could be cited is the corrugated projection and lattice windows over the *jangha* of Chaturmukha Mahadeva temple (Kalachuris) at Nachna, showing closer affinity with the Parvati temple (Guptas) standing in the same premises. The temples built in post-Kalachuri era are either stone or brick temples lacking much details. Some of these are double-storied structures of no significant architectural features.

Concluding Remarks

With the exception of a few temples, the *garbhagrihas* of majority of the temples of Kalachuri period are roofed

by the *latina shikhara*. These are of moderate height with subtle and elegant curvature. Sometimes, the stunted *shikhara* terminates abruptly, e.g., Sitamadhi, Kunwara Matha etc. Their *madhya 'uta* negotiates with the *amalaka*, as if trying to touch it. Particularly, the *shikhara* in delineation of the *chaitya* mesh filigree bears striking affinity with those of the temples of Pratihara period in Central India (Jarai-ka-Matha, Barwa Sagar, Jhansi, Sun temples of Umari and Madakheda, Tikamgarh, 900-1000 AD).

That the Pratihara idioms were frequently adopted by the Kalachuris is again evident with the embellishment of *naga-shakha* in the doorjambs and *garuda* at the *lalatabimba* of Rauhat temple in Sidhi. Even, the *udadhikumaras*, so common in temples of the Pratihara period, could be seen carved on the *udumbara* of Tighara temple (Panna). Tough identity of this temple is still obscure; architecturally it bears close resemblance with the Kalachuri period temples. Situated remotely, the temple in question has not attracted the attention of the scholars until recently.

One very obvious question which arises and remains unanswered is - under what compulsions the art motifs from one region/school were derived to other? It seems, in the post-Gupta epoch, the Pratiharas were in transitional phase and hence the Pratihara idioms could easily be noticed in the Kalachuri and Chandella period monuments. Likewise, being contemporary, the intermingling of art motifs between the Kalachuris and Chandellas could also be understood. For instance, the *anga-shikhara*, *kakshasana* and *makara-torana*, so frequent in the Chandella art could be seen in the Kalachuris as well.

Artisans of the period ventured into new experiments to be carried out in delineation of the *shikhara* and *garbhagriha*. Deviating from the established norms, *vrittakara shikharas* were added to the glory of the twin temples of Mahasaun and Chandrehe along with the circular *garbhagriha*. The artisans embellished the *shikharas* with the *chaitya* mesh in an exquisitely lucid manner. Barring temples of the early phase, the *madhya-lata* and *balapanjara* are consistently ornamented with *chaitya* mesh filigree. However, the *shikharas* of early phase temples are adorned with *chaitya* dormers. It rises from a fully or partly developed *varandika* and the number of *rathas* over it varies from three to seven, whereas in the temples with *vrittakara shikharas* the number of *rathas* may reach to sixteen. Number of the *bhumi-amalakas* on *karna-rathas* are three in the early phase temples and as noticed at Lilaha, it may be demarcated by the perforated diamonds - a rare combination.

As far as the configuration *of anga-shikharas* is concerned, the Sohagpur temple stands aloof, as the feature is not found in any other temple of the genre. Lastly, the entire scheme of embellishment over the *shikhara* is crowned by the pinnacle of usual members. The *sukanasika* is seldom preserved. More often, it stands in a highly repaired state. The *kapili* gives rise to a gable roof, which in turn attenuates into the *sukanasika*, usually adorned with the diamond motifs in niches. The central medallion provided in the *sukanasika* is carved with a bigger *chaitya* dormer harbouring images of one or other manifestations of the presiding deity in *sanctum sanctorum* (Singh 2002).

There may be a difference of opinion, whether some of the temples discussed in the article belong to the *Chedi* style or not, but certainly the period of their construction was that of the Kalachuris, because they were ruling over either one or another part of the region in that duration. Although, in want of any recorded evidence, it is hard to discern, that these newly discovered temples (particularly those of the first phase) were constructed under the patronage of the Kalachuris, nevertheless, stylistically these are nearer to the Kalachuri period monuments and *Chedi* style. Alongside these temples, artisans also built other temples, deviating from the Kalachuri period and Chedi style. Eventually, the features derived from the Pratihara and Chandella period temples could be seen employed in the Kalachuri period temples.

A gradual process of evolution in horizontal plan and elevation is discernible in the temples under discussion.

Temples of the early phase (first phase) are characterized by a ground plan having the *sanctum sanctorum* of modest dimensions. There is no provision for *antarala* and *mandapa* in these temples (both *antarala* and *mandapa* occur in the second and third phase). Interior of these constituents are devoid of ornamentations. Temples of this group stand are not erected on a platform in contrast to the second and third phase temples where either moderate or lofty platforms are seen. The *jangha* developed in temples of second and third phase and is divided into registers and the *varandika* along with *shikhara* in early phase temples is less evolved. All these are *nirandhara* temples.

The early phase temples are stylistically nearer to the south Kosalan temples showing underdeveloped features of temple architecture. The *madhya-lata, karna-ratha, venu-kosha* and *balapanjara* are not as prominent in the first phase of temples, as these are in the second and third phase. Not much could be said about the pinnacle and *sukanasika* of the first phase temples as these have not been found intact. Possibly, *sukanasika* was in formative stage until now as is evident from the Bandhavgarh group of temples. However, *shikhara* of the second and third phased temples presents a fine blending of advanced stage of development and ornamentation. Here, the *chaitya* mesh filigree, *bhumi-amalakas* along with other components are of advanced order. The arrangement of *latas* over the *shikhara* of Chandrehe temple exhibits a unique amalgamation of light and shade. The *sukanasika* in this group of temples holds a central medallion with a big *chaitya* dormer flanking divinities.

Vivid accounts of various styles and types of the circular temples are available in the classical Sanskrit literature including the *Brihatsamhita* of Varahamihira (Bhat 1995) and *Aparajitapruchchha* of Bhuvanadeva (Mankad 1950). The earliest brick built circular temple is datable to the Mauryan period (3rd century BC) which was erected at Bairat, Jaipur (Rajasthan). Another earliest circular temple - the Maniyar Matha in Rajgir, a brick and stucco structure, was constructed in 5th century AD. Perhaps, the Kalachuris of Tripuri were the first to build large circular stone temples in imitation to the earlier smaller prototypes in brick masonry (Mani 2003). Consequently, the temples of Chandrehe and Mahsaun came into being.

The temple *shikharas* of Sohagpur, Amarakantaka and Lilaha exhibit the highest peak of evolution whereas the Deotalava and Hanumana Bhata (Panna) represent the phase of decline of the Kalachuri's architectural grandeur. Further explorations will unravel other details.

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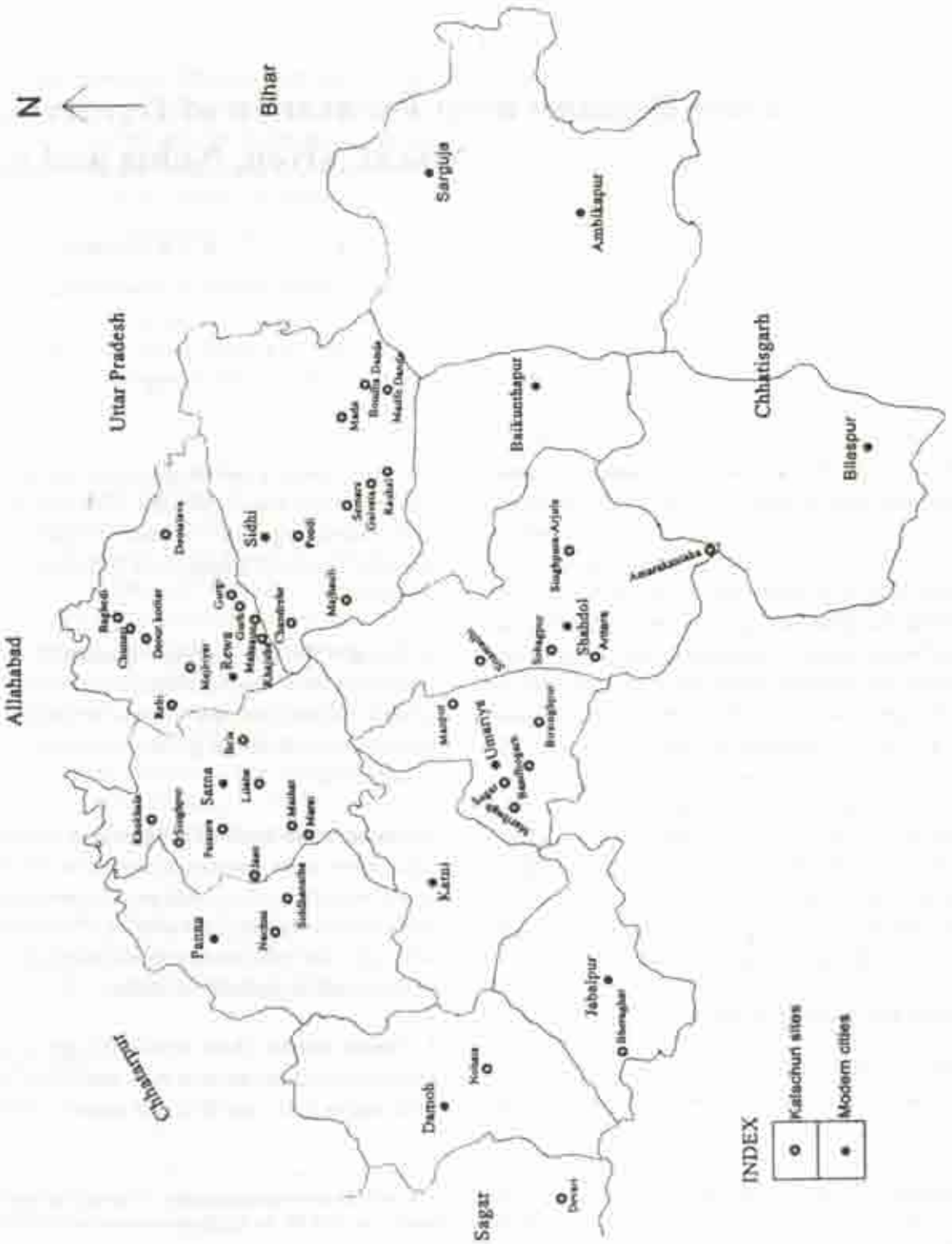


Fig.1: Architectural sites of the Kalachuri period

Plant Remains from Excavation of Terraces of the Nile at Afyeh, Nubia and Egypt†

K.A.Chowdhury, G.M. Buth*

In April 1966, B.B. Lal of the Archaeological Survey of India, New Delhi, handed over to the senior author some plant remains recovered during an excavation by him in Egypt. This was a Nubian culture roughly dated to Pre-Dynastic to Early-Dynastic period. Charcoal sample put to C^{14} test, has given the age as c. 2600-2400 BC. The material was in two lots – both charred. One lot apparently contained, "wheat, barley, lentil, gram, peas, etc" (Indian Archaeology – A Review 1961-62). These were collected, "from a level ground adjacent to a house, where they got charred, perhaps while temporarily stocked, may be after husking or some similar operation"(*op.cit.*). The identification of these materials is reported in this paper. The other lot contained a single wooden handle of a stone tool. It has not been possible so far to identify this due to lack of authentic wood samples from Egypt to match it. However, attempts to identify it continue.

Material and Method of Study

On examination of the charred plant remains, it was realized that there appeared to be a mixture of many materials, hence, a careful separation into different lots was required. It became possible to classify the material in the following groups: 1. Cereals. 2. Seeds of Legumes and other families. 3. Cotton seeds. 4. Rhizomes. 5. Animal Remains.

1. Cereals: The Morphological structure of cereals was useful in a general way. The anatomical study of microscope sections did not yield any structure of diagnostic value; however, peels from the grains gave some clue to their classification.

2. Leguminous Seeds: The seed coat of most of the leguminous seeds was very brittle. Even a touch with a needle broke the coat into small pieces. Embedding of entire seed coat was therefore not possible. Three small pieces were cut after embedding and revealed some structure which helped in general classification.

3. Cotton Seeds: There were only four cottonseeds amongst the debris. Most of them were in a bad state of preservation. Only one seed was almost complete. This

† This paper was received by me in the early 1970's, but it is very much regretted that it got mixed up with certain files. It has recently been spotted and I am forwarding it to *Paranatica* for publication, since it shows that even as far back as ca. 2500 BC the Egyptians were using cotton seeds as fodder. B.B.Lal.

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and other pieces were embedded and cut into serial sections.

4. Rhizome-like Materials: Although fairly large in size and in number amongst the debris, these were very brittle. It was possible to embed only six pieces by a slightly modified method of double embedding (Chowdhury and Ghosh 1951). Some cross sections and peels also gave useful information for their classification.

5. Animal Remains: In order to find out what the animals ate, the dung was dissolved in various liquids. Hot water dissolved the dung into lumps which were later treated with 2% acetic acid. This gave fairly satisfactory results.

Results

Cereals: The charred remains of grains have been separated under two lots, based on their shape and morphological characters, as (i) Group A: Belongs to *Hordeum sp.* and (ii) Group B: Belongs to *Triticum sp.* The preservation was bad and there were no remains of parts of the caryopsis. As a result, it has not been possible to trace the two cereals to their nearest species. One point should be emphasized here that out of the 1072 grains handed over to us, there were only eight grains of wheat, the rest were of Barley. Of the later, only 23 were covered with husk (Fig. 1). In one caryopsis, it has been possible to detect a bristle (Chowdhury 1963) so characteristic of barley (Fig. 2).

In addition to the difference in the dimension of grains, there is also a marked difference in their shape. The side view of the group 'A' shows a flat dome (Fig. 3), while that of group 'B' shows a raised dome (Fig. 4).

Legume Seeds and other Families: Based on shape and size it was possible to sort out different batches of seeds with similar morphology. It was noticed that some seeds had thick testa, while in others it was thin. The former when cut into microscopic sections, showed hourglass cells and palisade cells (Fig.5, 6). This indicates relationship with seeds of Leguminosae (Corner 1951). On the other hand, seeds with thin seed coat did not show either hourglass or palisade cells. Evidently, these do not belong to the family of Legumes.

Cotton Seeds: We came across four seeds with hair (Fig.7). This led us to examine seeds of many species belonging to the Malvaceae. Based on a comparative study of the length of hairs and their minute anatomy (Fig.8), it has been possible to trace these seeds from Afyeh to the cotton of commerce.

Much research has been done on the *Gossipium* of both old and the New World (Beasley 1942). At present are available a large number of hybrids suitable for profitable cultivation in different ecological environments. To examine all these varieties, for matching with the unknown, would have been a tremendous task.

Luckily, two points about this Nubian *Gossipium* were helpful for our investigation. Firstly, it comes from the Old World; secondly, the age of this sample shows that man had not discovered the art of plant breeding. In order to find out to which *Gossipium* species our sample shows closest affinity, the seeds of wild *Gossipium* growing in the Nile Region were obtained and a comparative

Table 1. Size of Cereals.

Name of Sample	No. of Grains	Length in mm.			Breadth in mm.			Remarks
		Av.	Min.	Max.	Av.	Min.	Max.	
Sample A: *Hordeum* sp.	10	6.6	6	8	3.0	2.5	3.5	Actual Grain
Sample B: *Triticum* sp.	8	5.7	5	6.5	3.8	3.1	4.5	Actual Grain

anatomical study of both the samples was done, leading us to a conclusion that the ancient Nubian *Gossipium* is similar to *G.arboreum var. soudanense* and *G.africanum* in almost all anatomical details.

The origin of the Old World cotton of commerce is not fully known. Some years back a few scholars were of the opinion that cultivated cotton of the Old World arose during the Indus Valley Civilization near Mohenjo-Daro (Hutchinson, et al. 1947), but this opinion is no longer held true. Now the theory proposed is that the cultivated cotton originated in South Africa (Hutchinson 1954). The new Nubian find has now supplied some direct evidence which will make it necessary for scholars to do some re-thinking about the origin of cultivated cotton. Of late, cottonseeds have been found at Mehrgarh in the Neolithic levels.

Rhizomes: Among the remains, we found 15 thick pieces (length: 5-12 mm; width: 2-3 mm) of plant parts, which were charred and looked like rhizomes. Since little morphological characters could be found on them, we tried to obtain some peels from outer surfaces. The peels revealed the presence of long and short cells, characteristic of the *Gramineae* (Metcalfe 1960). For further confirmation of the data, we cut some thin cross-sections of the rhizomes. The structure was interesting in that the entire rhizome was filled with abundant ground tissues in which the vascular bundles were distributed in a scattered fashion. There was a thick band of Sclerenchymatous tissues which separated the peripheral zone from the inner portion. The vascular bundles were small in the peripheral zone but large in the inside. It will thus be seen that the rhizomes belong to the *Gramineae*.

At this stage, it was thought advisable to search and find out if any grass in the Aligarh Muslim University Herbarium could be matched to it. A few grasses collected from the semi-desert land around Aligarh showed morphological resemblance with the unknown. Of these, one, namely, *Desmostachya bipinnata (Linn.)* was found to show very similar anatomical structure. We do not wish to commit ourselves by saying that rhizomes from Afyeh actually belong to *Desmostachya bipinnata*, but there is no doubt of its close affinity with this genus.

Animal Excreta: The charred animal excreta showed similarity to dung of goat or sheep. When compared with the excreta of living sheep and goat, there appeared to be more dung of sheep than that of goat. It was not possible to determine under the microscope what these excreta were made of. After dissolving in various liquids, quite a number of plant parts were recovered. These were bits of leaf-surfaces showing long and short cells. Silica cells were evident in some leaf pieces; serrated leaf margins were also present. However, the most interesting remains in these excreta were bits of cotton hair. Some looked like lint, while others resembled fuzz. The state of digestion of the hairs varied considerably; some showed no effects of digestion, while others were partly digested.

Archaeological Significance

A mixture of cereals, seeds of legume and cotton, rhizomes and animal excreta were collected from ground level just outside a house. The question arises is that what does it indicate? If only cereals and legume seeds were found, we could have drawn the conclusion that these were meant for feeding animals. Actual remains of dung of goats and sheep mixed with grass remains give additional support to this view. It is quite possible that these remains were from the swept-off garbage from a house or a shelter used for tethering goats and sheep.

The cereals contain both barley and wheat. The proportion between barley and wheat is 121: 1. Unless there has been a serious flaw in our method of sampling, the proportion of the two cereals is significant. Either there was more abundant crop of barley than that of wheat, or wheat was even at that time preferred to barley for human consumption. As a natural sequence, barley would have been used in larger quantities for animal food than wheat. Our present study does not allow us to say definitely which alternative was actually the case. Only further research on Nubian civilization is likely to reveal a clear picture on the use of wheat and barley by the Nubian people.

As a rule, leguminous seeds are eaten by men as well as animals. Men eat only those seeds which are not injurious to them. These are called edible seeds. Non-edible seeds contain harmful chemicals in their cotyledons and cause many diseases. We do not know whether the leguminous seeds from Afyeh belong to edible or non-edible group. It is therefore not possible at this stage to assign any archaeological significance to this find.

Cotton seeds amongst the plant remains from Afyeh, show presence of *Gossipium sp.* in the locality, some 4500 years ago. However, no remains of cotton cloth or textile were discovered. This may mean that although cotton plants were growing there, the use of cotton fibres for textile may not yet have developed. From a survey of all previous records on archaeological cotton, this appears to be the first direct evidence of use of cotton for fodder, long before its use for textile. Another point to note is that the Nubians knew the nutritive value of cottonseeds as fodder, although they were not aware of the chemical composition of these seeds as they do now.

Use of rhizomes of some Monocotyledons as animal fodder is evident from the plant remains at Afyeh. There is little doubt that this plant was available in the neighbourhood. If this plant is actually *Desmostachya bipinnata (Linn.)*, then its fodder value is rather limited, although it is known to be used as fodder in Afghanistan "possibly because in such arid country, fodder of any kind, no matter how unpalatable, enables the stock to survive" (Bor 1960).

Animal excreta have yielded parts of grass and cotton hairs. From this it would appear that the Afyean at that time were at a stage of economic life when they were trying to find out which of the local plants would serve as good fodder for their animals. One of the plants used by them namely cottonseeds have now proved to be a very nutritive food for domestic animals such as cow, buffalo, goat and sheep; while the wild grass mentioned above is now no longer considered to be a good fodder.

The culture of this locality is known to be "contemporary with early Egyptian pre-history" (Baumartel 1955). The present excavation has led B.B. Lal to conclude, "The inhabitants were essentially in a stage of rural economy, domesticating animals and carrying on agriculture" (Indian Archaeology- A Review 1961-62).

Results of our investigations on the plant remains from the excavation are in general agreement with the conclusion drawn by archaeologists. However, at the same time it should be pointed out that the culture was at a very early stage of rural economy in which plants were being tested for finding out their suitability for human and animal consumption.

Botanical Significance

The plant remains recovered from Afyeh do not indicate any significant change in the vegetation of this locality during the last 4500 years. This fact leads us to conclude that climatic conditions of this area have not changed much during these years. The cottonseeds now (Griffith and Crawfoot 1934) have some botanical significance. From all accounts, it appears that in ancient times there were only perennial *Gossipium* and no annuals. From this, the conclusion we may draw is that these seeds must have come from *Gossipium* trees belonging to *G. arboreum var. soudanense* or *G. herbaceum var. africanum* or to a species which is anatomically indistinguishable from either of these two.

Conclusions

Plant remains from the Nile at Afyeh, Nubia have yielded cereals, legume seeds, cottonseeds, rhizomes and animal excreta. The cereals are wheat and barley. The proportion of barley to wheat is 121:1. Without other supporting evidence, it will be not judicious to attach any significance to this difference in number.

Presence of cottonseeds of commerce is extremely interesting. This is the first archaeological evidence which indicates use of cottonseeds for fodder before they were used for textiles. Could it be that the nutritive value of

cottonseeds was known to these Nubians? Seeds of legumes and rhizomes of grass could not be matched or identified with any specific species, but there is little doubt that these might be something else.

All evidences have led us to conclude that the inhabitants of this place, 4500 years ago, were in an early stage of rural economy, in which they had partially domesticated wild plants and animals. The botanical evidences indicate that there has been no marked change in the climatic conditions of the area during the last 4500 years.

Acknowledgements

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Fig. 2: Caryopsis of barley



Fig. 1: Grains of barley covered with husk



Fig. 3: Cereals belonging to Group A "*Hordeum sp.*"



Fig. 4: Cereals belonging to Group B "*Triticum sp.*"



Fig. 5: Microscopic section of legume seeds



Fig. 6: Microscopic section of legume seeds



Fig. 7: Cotton seeds with hair



Fig. 8: Minute anatomy of cotton seeds

NOTES AND NEWS

Palaeolithic Tools from Mamom, Thiruvananthapuram District, Kerala

Introduction

The writer carried out an exploration along the river Attingal and the hilly tracts of Mamom in 2004, which culminated in the discovery of the first Palaeolithic habitational site in Kerala. The site of Mamom (Lat. 8°42' N; Long. 76°50' E) is situated 2 km south of Attingal town in Chirayinkil Taluk, Thiruvananthapuram District, Kerala and lies on the left bank of the river Attingal. The town of Attingal is situated midway on the Thiruvananthapuram - Kollam Road. Attingal is also locally known as 'Chittattinkara,' which means that the place is surrounded on all sides by rivers.

Mamom (Fig. 1) is a typical Palaeolithic habitational site. The hilly region provided very suitable environment for prehistoric habitation and rich floral and faunal materials for subsistence. The rock-shelters are situated on the highest point of the eastern part of the hill. One can see the Arabian Sea about 20 km away from the top of these rocks. Thus the site provided a high vantage point to the prehistoric man for surveillance. There is a small ephemeral stream nearby called Mamom river. The explorations revealed two rock-shelters and a Megalithic cist burial. One of the rock-shelters is facing east which is a very suitable orientation for using daylight for maximum number of hours. The bigger rock shelter measures 20 x 18 ft. (Plate 1) and has broken tallus from the ceiling of the cave forming the floor. Several Lower Palaeolithic implements have been found lying on the surface adjacent to the rockshelter. Both massive and medium-sized flakes were utilized for fashioning the tools. The large implements are of massive high-angled flakes. The raw material used is leptynite. The distinct feature of this site is that the river-worn pebbles were never used for fashioning the tools.

Considering the peculiar features of the tool types and raw material, the Palaeolithic culture of this region has been termed by the present author as 'Mamomian' after the type site at Mamom. The Mamomian industry can be divided into two types based on the typo-technological peculiarities of the tools. The Mamomian Industry-I shows the features of the Lower Palaeolithic industry whereas the Mamomian Industry II is Middle Palaeolithic in nature.

Mamomian Industry-I

Typology and General Characteristics of Each Type

(A) *Bivalve shell side-scraper*: It is a side scraper, measuring 150 x 10 x 37 mm, made on a large massive flake. It is called bivalve shell scraper because its dorsal surface resembles a bivalve shell. The raw material is leptynite. It has a dorso-ventral tapering towards the anterior end. This provides a very effective thin and chiselled working end. Butt-end is thick and seems to have been especially modelled for a right hand grip. The tool has 'finger-notches' at appropriate places to accommodate all the fingers and thereby providing a precision grip for the user. The maximum force is exerted on the tool from the upper part of the right palm, i.e., from the parts of *adductor pollicis* muscle and second lumbrical muscle. The tool might have been used for cutting and skinning animals (Pl.I. No.1).

(B) *Cleaver-cum-denticulate*: It is a multi-purpose tool made on a thick, massive flake. It measures 150 x 125 x 35 mm. The raw material used is leptynite. It has a dorso-ventral tapering from the middle of the flake towards the lateral borders. Thus, one of the portions of the flake is formed as a sharp scraper-cum-chisel whose working edge is parallel to the midrib of the flake. The next portion is formed as a denticulate whose working edge is knife-sharp and sturdy due to the step-flaking. The lateral flakings also culminated in the pointed distal end which can be utilized for digging purpose (Pl. 1, No. 3).

(C) *Denticulates*: (i) The first denticulate is the largest tool in the repertoire measuring 220 x 110 x 45 mm. It is a crude implement on a massive high angled flake of leptynite. Step-flaking is found on the lateral side. The rough dorsal surface, irregular deep flake scars, weathering of ventral surface, crudeness and uncontrolled flaking suggest it to be an early Lower Palaeolithic tool (Pl. 1, No. 4). (ii) Another denticulate is a relatively fine tool measuring 125 x 85 x 35 mm. The plain platform makes an obtuse angle with the primary flake surface. Secondary flaking is seen on both the surfaces. Retouches are seen along the margin on the ventral surface. Suitable grip is provided by the finger notches on either side. The tool is slightly weathered (Pl. 1, No. 2).

Mamomian Industry-II

In this repertoire, the tools have become smaller in size and more sophisticated. The tool technology has developed in many ways, but the raw material remained the same. One of the most important features of this group is the introduction of Levallois technique. Controlled flaking is attested by the shallow flake scars. Palaeolithic man of this region had some kind of aesthetic sense in fashioning his tools. Some of the tools clearly show typo-morphological evolution from the Mamomian Industry - I. Both finished and unfinished tools have been recovered from the surface.

Finished Artefacts

(A) *Backed Knife*: It is a beautiful *pipal* leaf – shaped tool made on a small thin flake of leptynite. The tool measures 75 x 75 x 25 mm. Retouching has been done to blunt the proximal end to provide a comfortable grip. Suitable 'finger-notches' have been provided to accommodate the thumb, the index finger and the middle finger of the right hand. On the ventral surface, the notch is provided to accommodate the distal phalanx of the thumb. Typo-morphological comparison shows that this tool has been evolved out of the bivalve shell scraper of the Mamomian Industry - I (Pl. 2, No. 2).

(B) *Penknife*: This tool, measuring 70 x 40 x 20 mm, is made on a thin leptynite flake. The straight working edge is produced by the removal of shallow and broad flakes on the dorsal surface. Then two slanting flakes were removed from the distal and proximal ends of the same side leaving a straight cutting edge at the middle to specify the working edge. Retouching is seen on the dorsal surface to provide a comfortable grip (Pl. 2, No. 4).

(C) *Borer*: It is a single-shouldered borer, measuring 100 x 65 x 20 mm, made on a Levallois flake of leptynite. The sturdy, pointed working edge is achieved by the intersection of small shallow flake-scars from the lateral sides near the distal end. Suitable 'finger grips' are made on both the surfaces. The tool is fine and carefully prepared (Pl. 2, No. 1).

(D) *Borer-cum-knife*: The manufacturer has successfully converted the Levalloisian flake of leptynite into a multi-purpose tool. It measures 80 x 55 x 25 mm, with some evident retouching. The tool has a peculiar feature. When it is used as a borer the ventral surface faces the thumb. In this posture the *adductor pollicis* muscle supports the proximal end. The working edge is formed by the intersection of two small flake-scars from both sides at the distal end. When the implement is used as a scraper, the dorsal surface faces the thumb. Here also the *adductor pollicis* muscle supports the proximal end. The working edge is produced by the removal of shallow and broad

flakes on both surfaces along a lateral margin that culminated in a straight, sharp border. The other lateral border is blunted by retouching (Pl. 2, No. 3).

Conclusion

The Pleistocene deposits of the peninsular rivers reveal that these have been deposited by high-energy streams in a sub-tropical to semiarid climatic conditions. In the light of the present discovery, it seems that the palaeolithic cultures of south Kerala are entirely different from those of north Kerala. In the north, the tools were exclusively made on river-worn pebbles with stray occurrence of nodules: whereas in the south the tools are made on flakes. The core tools of the north were essentially of chopper-chopping tradition similar to those of Konkan LPL industry and quartz was the main raw material used in that region.

In conclusion, the vicinity of Mamom was the promised land of the prehistoric man which provided him with rich floral and faunal assemblages, suitable raw materials for fashioning the tools, rivers and channels for supplying water, high vantage points for surveillance of the game and suitably spacious rock-shelters to provide a comfortable living.

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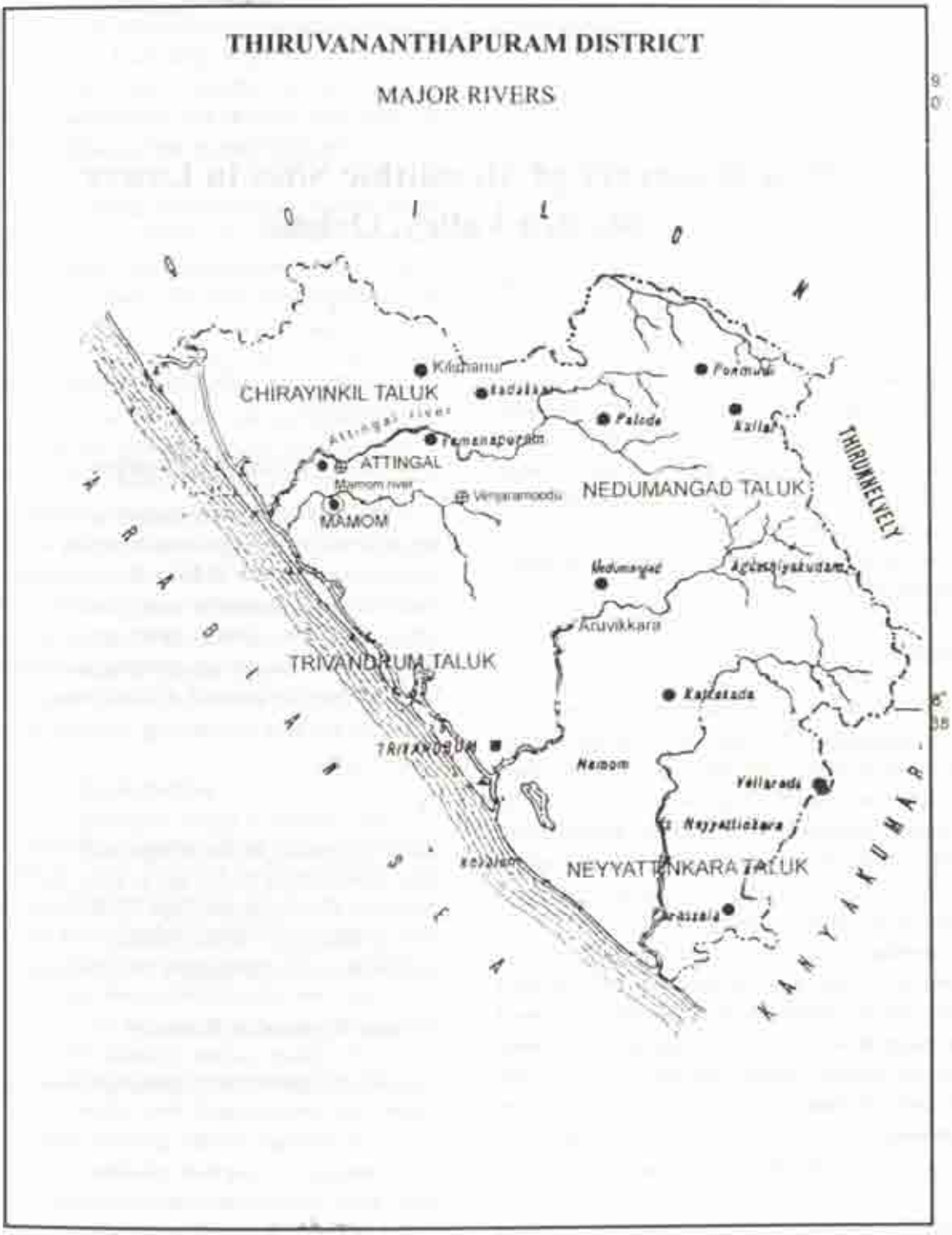


Fig. 1: Map showing the location of Mamom

New Discovery of Mesolithic Sites in Lower Bheden Valley, Orissa

The river Bheden (or Bonam) which originates from the western border of Bonaigarh subdivision of the district Sundargarh, flows through the Jharsuguda rolling upland and meets another rivulet near Rampur which is located about 10 km south-west of the district headquarters of Jharsuguda. Flowing east to west for about 129 km it receives tribute from a large number of seasonal streams and streamlets.

The Sites

Our intensive exploration undertaken for about two seasons in the lower Bheden valley resulted in the discovery of as many as 26 Mesolithic sites of various dimensions. Out of these, 15 sites are located on the right bank, namely- Katikela, Dabka, Parmanpur, Katang Mohan, Tarekela, Kulta Samasingha Sector-1, K. Samasingha Sector-2, Belmunda, Bhograpali, Budlapali, Purnapani, Kurapara, Kira, Mahuldihi Sector-1 and Mahuldihi Sector-2. Remaining 11 sites are on the left bank, namely Ghichamura, Kendamal, Bhimjor Suramal Sector-1, Suramal Sector-2, Mahadebpali, Ghunchhapali Sector-1, Ghunchhapali Sector-2, Dehripali, Gayamal and Charbhati. All the sites are open-air sites associated with a reddish-colour sandy-silt deposit. The spread of artefactual scatters in the investigated area varies from 20 x 10 metres to 300 x 250metres. The available sites demonstrate very little evidence for natural/anthropogenic post-depositional disturbances. Artefacts are generally found in mint-fresh condition on the erosional surface of reddish coloured sandy-silty soil. Besides Mesolithic, a few sites have also yielded stray artefacts, like handaxes, ringstones and ground Neolithic celts.

Macro Assemblage Composition

That most of them were factory sites, is clear from the nature of the assemblages, which include various type of cores, a good number of blank forms, finished/modified tools and a large number of waste products like chips and chunks which resulted from the blank detaching technique. This is further substantiated by the occurrence of sizeable number of primary as well as secondary blanks, core tablets, core-toes and core rejuvenating elements in the studied assemblages.

There appears a higher frequency of occurrence of flakes in almost all the assemblages while there is a marked low occurrence of blades and to some extent bladelets. However, from the point of view of blank utilization in the tool production, it is the bladelet, which have been maximally utilized at majority of the investigated sites.

Techno-Typological Features

Our preliminary morphological and mass analysis of blanks and cores sampled from all the 26 sites reveals almost all the stages of lithic reduction strategies adopted by the knappers. While flake constitutes the predominant blank form, bladelets occur in less frequency followed by blades. However, almost all the available cores were utilized for the bladelet production and there is a complete absence of flake cores in the studied assemblages. Furthermore,

while the length of the available cores lies between 22 mm and 67 mm, a fairly large proportion of the cores measures less than 25 mm in length. The majority of the flakes were resulted from core dressing and reduction process. The bladelets, however, predominated.

Secondary working or retouching appears on almost all the blank forms. Variability is also noticed in frequency occurrence and also in the types from site to site. Some 16 broad categories of tool types have been identified with many sub-varieties. In the retouched tool category there is a clear predominance of notched tools and different type of scrapers. Interestingly, burins, which mostly appear on thick flake blanks, are also fairly well represented. In the group of backed tools arch-backed point predominates over others. In most of the assemblages backed points were made on cherty material. Lunates, both elongated and short-broad varieties, are widely represented, while triangles and trapezes occur sporadicaly. It may also be noted here that some of the backed tools, particularly the geometries, exhibit typical ridge-backed retouch on the cord of the blanks. Tip spalling occurring on some of the backed points, also appears to indicate that these were probably used as hunting projectiles.

Raw Material Exploitation

Here rocks of crypto-crystalline silica groups have been extensively used. These are readily available in the gravel spread of the river Bheden and also in the nearby foothills in the form of nodules, pebbles and cobbles. Such as the milky, smoky and rosy quartz. Their percentage occurrence among the available blanks and cores varies from 54.47% to as high as 96.27%. In the order of frequency the raw materials used are quartz, chert, opal, agate, chalcedony, haematite, quartz-crystal and red jasper.

Conclusion

The foregoing accounts clearly demonstrate the tremendous potentiality for studying Mesolithic industries in the lower Bheden valley of western Orissa. It may above noted that except for a few ringstones, the lithic assemblages examined by us are devoid of any other heavy-duty tool types. It may be recalled that Ota (1986) has brought to light a large number of Mesolithic sites in the Boudh-Phulbani region of Orissa associated with heavy-duty pebble tools like choppers, horse-hoof scrapers, etc. Similarly, Mohanty (2000) has also reported as many as 58 microlithic sites associated with heavy-duty pebble-cobble tools in the Vaitarani river valley of Keonjhar district. Besides, recent archaeological investigation in the middle Mahanadi valley of Orissa also revealed similar association.

From the point of view of presence or absence of heavy-duty tool components, the Mesolithic industries of Orissa may be categorised into two broad groups. The sites belonging to Group - I are mostly characterized by geometric or non-geometric Mesolithic assemblages without the association of heavy-duty tools. The sites falling in the Group - II include those with evidence for microliths and heavy-duty tool components. Both the categories of sites have a wider geographic distribution in the state of Orissa, at least from the point of view of techno-typology. The assemblages in the Bheden valley may be kept in the Group– I category.

Significantly, none of the sites in the valley are found to be associated with potteries of any kind. Generally, geometric microlithic assemblages unassociated with ceramic evidence are considered chronologically earlier than those associated with pottery assemblages. Whether the above-mentioned categories of microlithic assemblages represent two distinct Mesolithic industrial traditions, is beyond our comprehension at the moment.

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Neolithic Coastal Karnataka: an Assessment

Endowed with scenic beauty, the coastal region of Karnataka lying approximately between longitudes 74°35'-75°40' East and latitudes 12°27'-15°31' North is a long narrow strip of land mass. It encompasses the present-day districts of Dakshina Kannada, Udupi and Uttara Kannada. This land mass has a coastal line running to a length of about 400 km with a gradual transition between the Konkan coast in the north and the Malabar coast in the south. This stretch of the coastal line forms the part of Indian west coast and has many natural harbours and port towns since the ancient days.

Neolithic Discoveries

In the coastal region under assessment, as early as 1968-69, S.R. Rao and A. Sundara had discovered a ground stone axe at Honnavara and a few sherds of Neolithic coarse grey ware akin to the Maski type in rock-shelters on the hill slopes near Ramatirth at Gokarna (Rao *et al* 1968-69). Subsequently, the latter has expressed his own reservations about the true character of the specimens (Bhatsoori 1990). After a gap of nearly a decade and a half, a Neolithic axe was found at village Anmod, Dt. Uttara Kannada. The basalt axe, measuring 24 x 7 x 3 cm, was kept in a Shiva-Devi temple (Bhatsoori 1985-86, 1990). In 1987, Vasantha Shetty drew the attention of scholars to the occurrence of Neolithic axes in the southern coastal region. According to him, one Ramesh Achar chanced to find a Neolithic axe of dolerite, measuring 12.3 x 6.4 cm, in a field situated along the slopes of a hillock on the northern bank of river Sita near the village Bandi Math in Udupi Taluk. Subsequently, he also brought to light a few more Neolithic axes found in Udupi Taluk. Among these was a highly polished axe, measuring about 25.5 cm in length, found on the river Suvarna near village Haradi. In 1989, another axe was found while digging earth at Kotatattu, again from Udupi Taluk. This dolerite axe, measuring 11x 4 cm and having a circumference of 14 cm, was without polish. This find was followed by locating one more axe from the same place. Yet another axe was collected while excavating an elevated area near Sri Vani High School in Naduru (Vasantha Shetty 1987, 1991).

In 1992-93, A.K. Sharma reported a Neolithic site at Anshi in Karwar Taluk, Dt. Uttara Kannada. He noticed the presence of shale, a raw material used for fabricating Neolithic tools, exposed on the banks of a rivulet flowing near the river. Two broken pieces of Neolithic artefacts were also picked up from this area (Sharma *et al* 1992-93). L.S. Rao found a mace-head from Kumta and two highly patinated axes from Neelakonda in Kumta Taluk, Dt. Uttara Kannada. Among the specimens of Neelakonda, the bigger one is oblong in form and rectangular in cross-section with thick butt-end and convex cutting edge while the smaller one is also rectangular in cross-section but with an oblique butt-end having more or less a straight cutting edge. A few fragments of a quern are also reported from Kotatattu, Dt. Udupi (Rao 1992-93, 1993-94, 2004). K.B. Shivatarak has discovered a Neolithic site at Barkur in Dt. Udupi and also listed Shirpur in Supa Taluk, Dt. Uttara Kannada as a Neolithic site (Shivatarak 2001, 2004). Recently, Narasimhamurty has brought to light a Neolithic habitation site in Paje hills at Kurkalu in Dt. Udupi. The Neolithic axes from this site are almost lenticular in cross-section with a sharp working edge and pointed butt-end. The associated

pottery found along with the axes is generally grey or pinkish buff ware with white grit material and irregular striation marks on the interior (Narasimhamurty 2005).

Discussion

As mentioned earlier, Anshi and Kurkalu are the only known habitation sites in the region under investigation. At Anshi, the nearby mound is disturbed. In Kurkalu, the Neolithic pottery is almost similar to the typical Neolithic and Neolithic-Chalcolithic ceramic industry found in excavated sites like Sanganakallu II (I) (Subba Rao 1948) and III (I) (Ansari and Nagaraja Rao 1969), Hallur I (I) and Tekkalakota I in Tungabhadra valley.

Now, the butt-end axes reported mostly as stray finds found in different contexts need to be examined. As noted earlier, Naduru and Kotatattu specimens were discovered while levelling/excavating the earth. The settlement pattern of Neolithic folk in peninsular India shows that these people had preferred the top of hillocks like Sanganakallu and Tekkalakota, slopes and foothills as seen at Banahalli and open river valleys like Hallur and T. Narsipur for their habitation. The find spots of Bandi Math and Haradi, being on the riverbanks, are worthy of consideration here.

The Neolithic sites located in the contiguous areas also may be noted here. These include finds from Guddemaradi near Shimoga city, Nilaskal on Shimoga-Coondapur road and Kundada Gudda or Kundadri on the banks of river Malati, a tributary of Tunga (Sundara 1968). Sites discovered in Shimoga Districts by K.P. Poonacha from Shimoga District include Sasivehalli, Naga Samudra, Holehatti and Holebenavalli (Poonacha 1980-81).

In the adjoining regions of Goa, a pointed butt-end of Neolithic polished stone axe of ovaloid cross-section has been reported from Surla village in the upper reaches of river Mandvi (Sundara 1968). In 1979-80, polished stone axes, chisels and hammer stones, etc. were found on an elevated plateau located to the north-west of village Arali (Banerjee *et al.* 1979-80). In Kerala, Neolithic axes have been found at Pulppaji and Cinneri from Wynad area (John 1960).

The reported finds cited above prove that the occurrence of Neolithic sites on the coastal Karnataka is similar to that of the adjoining regions whose geo-morphological environment is almost similar to the region under discussion.

Chronology

The Neolithic cultures of the lower Deccan and Karnataka in particular have been fairly well documented including its early phases, cultural matrix and chronology etc. The C^{14} dates known from some of the excavated sites are: (i) Kodekal – 2460±105 BC, (ii) Terdal – 1770-1935±100 BC, (iii) Tekkalakota – 1540-1780±105 BC, (iv) Sanganakallu- 1550-1585±105 BC, (v) Palavoy – 1540±100 BC, 1965±105 BC, (vi) Hallur – 1195±100, 1425±110, 1710±105, 955±100, 1105±105 BCE - the last two dates are from Neolithic-megalithic overlap phase, and (vii) T.Narsipur – 1495-1085±100 BCE. Thus, the Neolithic culture of coastal Karnataka was placed in the time bracket of 2500-1000 BC based on C^{14} dates and the pottery traditions. Although, the recent excavation at Watgal (Devaraja *et al.* 1995) warrants an earlier beginning by a few centuries.

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The Excavation of a Neolithic Site at Lakkundi

In continuation of the last year's excavation of a medieval town site at Lakkundi, a historical place known for its temples of the Rashtrakuta-Hoysala period, a Neolithic habitation site from the same locality was excavated by the Directorate of Archaeology and Museums, Karnataka State Govt. in March-June 2005. The excavations were directed by R. Gopal, N.V. Joshi and T.S. Gangadhar of the Directorate alongwith A. Sundara. The aim of the excavation was to establish the cultural antiquity of the place and to identify the salient features of the culture in the middle region of North Karnataka.

The site is located about 5 km northeast from the popular 'Budi Basavanna' temple on the Lakkundi-Koppala road. The site is about a hectare in area and is almost plain with ashy earth. The pottery found is mostly the Neolithic grey ware of different fabrics. Also found on surface are black stone fragments, flakes, polished stone axes, chert blades and flakes, semi-fossilised animal bones, granite stone rubbers, querns, sling balls, lumps of scoriaceous ash, etc. About half a kilometre north of the site is a small seasonal rivulet that joins another nala reaching the Tungabhadra.

An area of 30 x 20 m was selected for excavation. It was divided into 6 sectors of 9 sq. m each; these sectors were further sub-divided into four quadrants of 4.25 sq. m. The Sectors were numbered as A, A1, XA1 and B, B1 XB1 from east to west and the quadrants 1, 2, 3 and 4 in cyclic order. All the sectors were excavated to varying depths. One quadrant was excavated upto the natural soil. The total depth of the cultural debris was found to be ranging from 60-65 to 70-75 cm that could be further distinguished into four consistent layers all over the area. The fourth layer is natural soil of reddish brown colour comprising of disintegrated stone flakes and fragments. Layers 2 and 3 are highly ashy with plenty of cultural relics. The pottery from these layers constitutes Iron Age Megalithic Black-and-Red ware, black ware, red ware, micaceous grey ware of different fabrics. The other finds include Neolithic axes, chert blades, fluted cores and flakes, stone and terracotta perforated beads, fossilised animal bones, etc. Layer 1 is humus.

Two cultural phases were recognized: Early Neolithic (of the Chalcolithic stage) and Late Neolithic (overlapping with the Iron Age Megalithic). The most noteworthy finds in the late phase are: (i) an unusual occurrence of Iron Age Megalithic burial in the habitation area, and (ii) large and small patches of what looks like a floor of stone chips mixed with ashy clay, rather hard in some quadrants. The burial in Sector B comprised of a big pot, the upper part of which is crumbled and the sherds fallen into the pot itself, surrounded by three bowls of black ware and a Black-and-Red ware vase of medium size. The bowls were placed on ring stands of black ware and one of red ware. Within the big pot were found a few human bone pieces and an iron arrowhead, flat and triangular in shape with circular thin short tenon for inserting a wooden shaft.

Apart from all these, indeed noteworthy is the unusual occurrence in the early phase of three circular pit-dwellings

near to one another. They are almost perfectly circular, and were clearly visible on the surface due to their ashy colour contrasting to the reddish brown earth of the surrounding area. One of them was completely excavated. It contained Neolithic grey ware pottery and a stone block on the floor in the centre. Outside the perimeter of the pit and close to it is a small pit that may have been a post-hole. However, none of the other post-holes, if there were any, surrounding the pit could be traced.

The excavation has shed welcome light on some aspects of the Neolithic-Chalcolithic culture as follows:

1. Occurrence of what may be deemed as dwelling pits in the early phase of the Neolithic culture is the first of its kind to be discovered in Karnataka. Of course, east of this region in the lower Krishna valley, similar pits are found in Nagarjunakonda and Gundluru in Dt. Guntur of Andhra Pradesh. Many of them are definitely dwelling pits (Pl. 1). Now the pit-dwellings in Lakkundi are the westernmost known so far. If the life-style of the people here was more or less similar to those of the lower Krishna valley is being examined.

2. The scoriaceous ash lumps found on the surface and sporadically in the cultural layers of the late phase seem to indicate that there was an ash mound near the site, of the type and kind found at many places at or near the Neolithic sites of the Krishna-Tungabhadra doab, such as Kupgal, Kodekal, Budihal, etc. If so, the ash mound site of Lakkundi is the south-westernmost known so far. Further, if the rammed mixture of clayey earth and stone flakes is at the base of the mound, then it could be similar to the one noticed in the 1976-77 excavation of the ash mound of Kupgal by the Deccan College, Pune.

3. The Megalithic pot-burial of the late phase seems to imply an unusual practice on the part of the people of the culture (Pl. 2). In the 1954 excavations at Maski by the Archaeological Survey of India, some pot-burials of the earliest phase of the Iron Age Megalithic period were found within the habitation area. Similarly, the pot burial in Lakkundi may belong to the earliest phase of the culture in this region. It may be recalled here that 10-15 km southwest of this site are discovered Megalithic burials in Hosur and in other nearby localities at the foot of the Kappat gudda in Gadag area. For the first time in this region, Lakkundi has provided some characteristic features of the disposal of the dead by the Megalith-builders.

4. Lastly, 2004 excavations in the medieval site within the locality of Lakkundi had revealed a sequence of three cultural periods: Late medieval (i.e. Vijayanagara and Post-Vijayanagara); Kalyana Chalukya – Hoysala and the Rashtrakuta. Of course, the first two periods are known otherwise from inscriptions, temples monuments, tanks and forts and also from local oral traditions; but the last one is known vaguely from two or three temples such as Halgundi Basavanna temple etc. in the locality. However, while excavating this mainly Neolithic locality, clear-cut Rashtrakuta cultural period was exposed in the uppermost levels. There are indications of the existence of remains of the Satavahana period also.

Thus, this year's excavations have extended and elaborated upon our knowledge of the cultural history of this region to a great deal. It is now possible to reconstruct an outline of almost unbroken cultural history of the locality right from the Neolithic of ca.1500-1600 BC to the present.

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Excavation of Kudachi: An Ashmound in Dist. Belgaum

A small-scale excavation was undertaken in April-May 2005 at the ashmound site of Kudachi (Tk. Raibagh, Dist. Belgaum) by the Dept. of Ancient Indian History and Epigraphy, Karnatak University, Dharwad. The aim of the excavation was to understand the nature of the scoriaceous ashmound located in the Chalcolithic habitation site and its stratigraphic and cultural relation with the site.

In 2004, a preliminary survey of the site for the purpose of the excavation was carried out. The ashmound site is about 1 km west of the river Krishna. Unfortunately, from the time of its discovery in 1965 (Sundara 1970-71), the mound had been drastically reduced by digging for earth by local people for domestic purpose. Lumps of scoriaceous ash of amorphous shapes and sizes were found scattered here and there around the mound.

In all, three trenches, numbered 1, 2 and 3 were laid in a view to obtain a complete stratigraphic sequence. Trench 1 (1.5 x 1 m) was laid on the top near the eastern end; Trench 2 (3 x 2 m) was laid on the northwestern side; and Trench 3 (1 x 1 m) was laid on the northern side. The entire section on all the sides was cleaned to get a clear and unambiguous picture of the scoriaceous ash. It became clear that throughout the section, from one end to the other, and from top to bottom, there were pockets of cultural debris within the ash deposit. This excavation has mostly yielded pottery of two principal types: (i) micaceous grey ware of the Neolithic-Chalcolithic period, as is found in the Krishna valley and (ii) the Savalda pottery. In addition, beads are found sporadically all over the mound.

Total six layers could be distinguished. The first four layers are not habitational layers but later accumulations of earth and debris etc. In these layers are found pottery pieces in small numbers belonging to both Chalcolithic and Megalithic periods. Consistently throughout the excavated area, Layers 5 and 6 are true habitation layers, underlying the ash mound. Ashy in nature, these layers contain charcoal bits, apparent floor patches, potsherds of various fabrics, animal bones, chert and chalcedony blades, flakes and fluted cores. In layer 5, potteries of the two kinds mentioned above occur in almost equal proportion; and in the layer 6, the grey ware pottery is more frequent. Besides the megalithic pottery, highly polished black-slipped pottery is found in small numbers in layer 5. This pottery may be intrusive in nature. Layer 7 consists of natural soil of stony, reddish black earth.

All these clearly indicate that soon after the desertion by the occupants of layers 5 & 6, the site was used as a dumping ground for ash and cultural debris by the later inhabitants of some nearby site. This site cannot be traced now because of the cultivation and standing crops. As mentioned above, in this vicinity there are seven known habitation sites, among which there are two with associated ash mounds and one with early historical cultural remains. One of these habitational sites is 1 km southeast of the present site.

It is therefore probable that originally the people in the Chalcolithic stage had settled down and lived here for some time. There was then no such human activity which

could have produced scoriaceous ash as a by-product. The site was deserted at some point of time, perhaps owing to frequent river floods. The people moved to a safer place nearby. It is in this new settlement area that, as a by-product of some major activity, scoriaceous ash on a large scale was produced. The ash was carried and dumped in the previous settlement site.

What was the activity of the people that involved large-scale burning of some fuel (most probably cow-dung, as known from other excavated sites) at a very high temperature? It is observed during the excavations that many ash lumps scattered on the surface of the mound as well as in the section have oval shaped depressions about 6 x 4 cm in size and 2 cm deep at the centre having a thin layer of bright deep brown material. The excavators got a few samples of the materials examined by some local smiths. They, after chemically examining these, found it to be the residue of copper. Sundara had previously noticed similar characteristic features in some loose scoriaceous ash lumps from the site of Sanganakal. Of course, some more characteristic samples need to be scientifically examined in a science laboratory to draw any firm conclusions regarding this. Since this activity of the people was begun at a later stage of occupation, the question of the identification of the authors of this activity arises. Were they the Savalda-culture people or the users of Black-and-Red pottery? The layer 5 is having considerable proportion of the Savalda pottery, but there are almost no scoriaceous ash fragments. In such circumstances, it is probable that the users of the Black-and-Red ware pottery, who were having the knowledge of copper smithy, might be the originators of the ash mounds in the Upper Krishna valley.

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Identification of Buddhist Sites in Trans-Ghaghra Plain

Introduction

Trans-Ghaghra Plain in the middle Ganga valley is a monotonous flat land sloping from the northwest (elevation 102 m.) to the southeast (elevation 10 m.) and forms a distinct geographical and cultural entity. It is bound on the north by the Nepal tarai, on the south and west by Ghaghra/ Sharayu river, and on the east by little Gandak. The region has been classified into three broad divisions, viz., (1) The Tarai (2) The Bhangar or upland (3) The Kachhar or the flood-prone lowland. The region of Trans-Ghaghra Plain comprises the present day districts of Gonda, Bahraich, Balrampur, Sravasti, Basti, Siddharthnagar, Sant Kabir Nagar, Maharajganj, Gorakhpur, Deoria and Kushinagar. The whole region is drained by the several rivers including Ghaghra (Sharayu), Rapti, Ami, Kuwano, Manwar, little Gandak etc.

Trans-Ghaghra Plain was an important political as well as cultural centre during the 6th c. BC. The Mahajanapada of Kosala and republics and states like Shakya, Koliya, Malla and Moriya flourished in this region. This region is the birthplace of Gautam Buddha, who spent most of his lifetime here. Buddhist texts mention numerous places from this region, categorizing each as either *gama, nagara* or *nigama*. The aim of this paper is the analytical study of the various identifications of these places by various scholars in the light of new researches.

Places Mentioned in the Buddhist Texts and their Identifications

1. Atuma: The *Vinaya Pitaka* refers to a *nigama* called Atuma that lay between Kusinara and Sravasti. B.R. Mani has identified Atuma with the modern village called Ama, near which is a large mound. Its location is almost between Kushinagar and Sravasti. This village is on the right bank of Bainara nala, 27 km north to Basti. The cultural remains found at this site belong to 6th c. BC.

2. Devadaha: *Majjhima Nikaya* and *Samyutta Nikaya* refer that it was a *nigama* of the Shakyans. Lumbinivana, where Gautam Buddha was born, was nearby this place. W. Vost identified it with Pararia village which is about 7 miles east to Piprahwa. Some scholars have identified Devadaha with modern Vanrasia situated in Maharajganj Distt.

3. Khemavati: *Buddhavamsa* mentions that it was the *nagara* from where Khema and Janasandha ruled. It was also the birthplace of Tissa and Kakusandha Buddha. A.C.L. Carlleyle identified Khemavati with the ruins near Khemrajpur & neighbouring village in Distt. Basti.

4. Koliyanagara: It was a *nagara* in the Koliyan State. The *Kunala Jataka* gives the references of fight between the Koliyans and the Shakyans for the rights of the waters of the Rohini, which irrigated the fields of both sides. A bloody feud was averted by the Buddha. A. Cunningham identified Koliyanagara with present site of Koraondih which is situated 18 miles to the east of Basti and on the right side of Rapti River.

5. Kapilavastu: It was the capital city of Shakyans. Rohini River flowed near Kapilavastu and formed the boundary between Shakyans and Koliyans. Buddha's birthplace

Lumbinivana was nearby. The nigrodharama near here was the Buddha's favourite resort. Shakyans built a Stupa on the remains of Buddha's relics at Kapilavastu. Fa-Hien has mentioned the distance between Sravasti and Kapilavastu 91 miles, while Yuan-Chwang has mentioned 83 miles.

Cunningham had identified Kapilavastu with Nagarkhas and Carlleyle with Bhuiladiha both in Distt. Basti. A. Fuhrer identified Kapilavastu with Tilaurakot in Nepal. In 1890, W.C. Pappe excavated Piprahwa and found the famous Piprahwa vase containing Buddha's relics, beads, gold ornaments etc. and an inscription on the vase. In 1962, Debala Mitra of ASI excavated Tilaurakot and, as a result, remarked that Kapilavastu is to be sought in the mounds around Piprahwa and not at Tilaurakot.

K.M. Srivastava of ASI excavated Piprahwa and Ganwaria from 1971 to 1977. These excavations were carried out with a view to identify ancient Kapilavastu. Srivastava identified Piprahwa with monastery area and Gangwaria as town area of Kapilavastu. The evidence of 6th-5th c. BC, confirmed by C^{14} dates, was found from lower level. The remains of many structures like monasteries, houses, stupas were found here. The most important findings, which established the precise location of Kapilavastu, were seals and sealings bearing the legend – '*Om devaputra vihare Kapilavastu sa bhikkhu sangha*' and '*maha Kapilavastu bhikkhu sangha*'.

6. Kusinara: Kusinara appears to have been the capital of one of the two groups of Mallas; the other group had their capital at Pava. When Buddha died, Kusinara was a small township in the midst of a jungle. In later literature, Kusinara is said to have been 12 x 7 Yojana in area with seven ramparts, four gates and seven *aramas* of palm tree. It lay on a high road from Alaka to Rajgriha, the road taken by Bavari's disciples. To the east of the city was Muktabandhana, the shrine of the Mallas, where Buddha's body was cremated. Kusinara became one of the four holy places declared by the Buddha to be right places for pilgrimage for the pious, the other three being Lumbini, Isipatana, and Bodh-Gaya. A Cunningham identified Kusinara with Kasia at the junction of Rapti and little Gandak in Kushinagar Distt. This view has been strengthened by the fact that in the stupa behind the *nirvana* temple near this village a copper plate has been discovered bearing the inscription '*parinirvana chaitya tamra patta iti*'. There is also a statue of Buddha in *mahaparinirvana* form at this place.

7. Medatalumpa: It is mentioned in *Dhammachetiya Sutta* as a Shakyan *nigama* and is identified with Mehandaval township (Dist. Basti) by B.R. Mani on the basis of the philological similarity between the names and the geographical location as well as its traditional fame as a market-place. There are evidences of ancient remains in western, northern and eastern parts of the township ranging from NBPW period to Kushan period.

8. Nagaraka: The *Dhammachetiya Sutta* mentions Nagaraka as a Kosalan *nigama* from where the Kosalan king Pasenadi (Prasenjit) visited Medatalumpa, a shakyan nigama, where Buddha was staying. The distance between Nagaraka and Medatalumpa is given 3 yojana, which was covered by Pasenadi in a chariot. The site of Nagaraka is identified by A. Cunningham with Nagarkhas which is situated on the eastern bank of Chando Tal at a distance about 10 km southwest to Basti. The area of the site is about 600 x 800 m. B.R. Mani has also identified this settlement with the modern settlement of Nagarkhas in Basti district.

9. Pava: This *nagar* was the capital of the Mallas. Buddha visited this settlement from time to time and stayed at the Ajakalapaka Chetiya. Pava was connected to Bhogagamanagara and the three *gavuta* long road from Pava to Kusinara passed over Kakuttha River. It was at this city that Buddha ate his last meal in the house of Cunda, the smith. A stupa was erected in Pava over the Mallas' share of the mortal remains of Buddha. A. Cunningham had identified Pava with Padrauna. On the other hand, Carlleyle had identified it with the ruins of Sathion and Fazilnagar in Dist. Deoria. After the excavations at Sathion and Fazilnagar, a sealing was found in which '*shresthigramagrahasya*' was mentioned in Guptan Brahmi, which has not resolved the issue.

10. Pippalivana: Pippalivana (Nyagrodhavana) was the capital of Moriyas. Moriyas claimed their share of the Buddha's relics, but as they arrived late, they had to content themselves with a share of the ashes (*angar*) only. They then built a stupa (Angar Stupa) over the ashes. Travel accounts of Fa-Hien suggest the location of Angar Stupa at 4 yojana east from Rapti and 12 yojana west from Kusinara. On the basis of this, Cunningham suggested Sahankot near Rudrapura in Distt. Deoria as Pippalivana. Based on Yuan-Chwang's travel account, in which he said that Kusinara is on the northeast of Nyagrodhavana, Carlleyle identified Pippalivana with Rajdhani village or Updhaufiadih situated to the south of Gorakhpur, on the bank of Gorra River.

11. Ramagama: It was a settlement from where the Koliyans ruled. A stupa was erected here over the Koliyans' share of the mortal remains of Buddha. Carlleyle tried to identify it with the modern village of Rampur Deoria in Distt. Basti. W. Vost identified it with Bhuila Dih and the stupa to the east of Jaitapur as representing Ramagama and the famous Ramagama stupa respectively. Cunningham identified it with the ruins near Deokali in Distt. Basti. The archaeological remains found on the surface belong to about 6th c. BC to the 3rd c. AD. On the northern side of the main mound, there is a brick structure possibly representing the remains of a stupa.

12. Sala or Salavatika: Sala or Salavatika mentioned in Pali texts is identified by B.R. Mani with Sevaidih, located on Basti-Doomariaganj road at a distance of about 19 km from Basti. According to him, in *Saleyyaka Sutta* of the *Majjhima Nikaya*, Sala has been mentioned in connection with Buddha's visit to the place in the country of the Kosala. In the same area of the Kosala, *Digha Nikaya* mentioned a place called Salavatika where *Lohichcha Sutta* was preached by Buddha and it is also mentioned that the village was given to Lohichcha, a Brahmana, by Pasenadi (Prasenjit). Sevaidih mound is about 300 x 200 m with an average height of 2 to 3 m. There is a modern Shiva temple constructed on the top of a stupa. During explorations, black-and-red ware, black-slipped Ware, NBP Ware, grey ware and red ware were found.

13. Setavya: Digha Nikaya mentions this as a Kosalan *nigama* near Ukkattha to which it was connected by a high road. To the north of this settlement was the Simsapavana where Kumara Kassapa lived. This settlement was on the road taken by Bavari's disciples, from Sravasti to Rajgriha and was the first halting place outside Sravasti. W. Vost identified Setavya with Satiaba and Basedita, 17 miles from Sahet-Mahet and 6 miles from Balrampur. On the other hand, B.R. Mani identified Setavya with Siswania, 9 km southeast of Basti city on the left bank of Kuwano River. B.R. Mani excavated Siswania and Deoraon and the cultural assemblage of the site was found to be ranging from pre-NBPW period to Kushana and late medieval period.

14. Sobhavati: *Buddhavamsa* refers that it was the *nagara* where Konagamana Buddha was born in the Subhagavati Park. It was the *Rajdhani* of King Sobha. A.C.L. Carlleyle identified this site with a large mound of ruins called Khopoa-dih, situated in Basti Distt. The mound of Khopoa is situated on the northern side of a lake.

15. Sravasti: Sravasti was the capital city of Kosala and was situated on the Aciravati (Rapti). According to the Vishnu Purana, it was founded by Sravasta, a king of Solar race. Rama, the king of Ayodhya, made his son Lava the ruler of Sravasti. During the time of Buddha, Kosala was one of the sixteen great kingdoms (Mahajanpadas) of northern India, and Sravasti was counted among the six big towns. Buddha passed most of his monastic life at Sravasti. The Jetavana, a royal garden near Sravasti, included Anathapindaka's monastery and became a favourite retreat to Buddha. The Jatakas are full with accounts of the glory and richness of Sravasti. The road from Rajgriha to Sravasti passed through Vaishali, Setavya, Kapilavastu, Kusinara, Pava and Bhogagamanagara. A. Cunningham identified Sravasti with modern Sahet-Mahet on the south bank of Rapti, on the border of modern Balrampur and Sravasti Distt. It was confirmed by the find of an inscribed Kushana style Bodhisattva sculpture, the

inscription mentioning Jetavana. The Bharhut relief has depicted the Jetavana scene with two buildings, the Gandhakuti and Kosamkuti; these were identified with the two brick structures in the monastery area. K.K. Sinha excavated Sahet-Mahet in 1959. According to Sinha, Period I, which is dateable to 600-300 BC, had no brick structures. The brick structures begin from period II which is dateable to 275-50 BC. This view was based on stratigraphic analysis and relative dating method. The site was further excavated by ASI and Kansai University, Japan and the earliest cultural sequence was confirmed.

16. Ukkattha: It was a *nagara* in the Kosalan country and was connected to Setavya and Vaishali by high roads. *Digha Nikaya* refers that it was thickly populated and had much grassland, woodland and corn. It was located near the forests called Icchanangala, Anasanda and Sublagavana. *Digha Nikaya* refers that Ukkattha was donated as *brahmadeyya* by the king of Kosala to Pokkharasti. B.R. Mani has identified this site with modern Ukada located at a distance of about 7 km north of Basti. The area of the mound is approx 150 x 150 m. A 4 m high brick mound roughly circular on plan is located there, probably representing the remains of a stupa. In the past, there were two forests full of Sal and Mahua trees on its southern and western sides which were cut in the course of time to make the land cultivable. These might represent the old forests mentioned in Pali texts.

17. Vehalinga: It was a *gama-nigama* of Kosala. *Ghatikara Sutta* of *Majjhima Nikaya* refers that Buddha had preached the *Ghatikara Sutta* to Ghatikara, a friend of Jotipala at Vehalinga or Vebhalinga. B.R. Mani identified Vehalinga with the two mounds of Behil on philological grounds and archaeological evidences. Behil is located at a distance of 17 km from Basti on Basti-Mahuli road. There is a Shiva temple on the top of a circular mound which seems to be a stupa, probably erected in the memory of the place having been blessed with Buddha's preaching at the site. The main ceramics which were found here are black-slipped ware, NBP Ware, grey ware and red ware which take back the antiquity of this site to 6th c. BC to Kushana period.

Analysis & Conclusion

There are many differences of opinion in the identification of various places as mentioned in the Pali texts. The identification of Kapilavastu with Piprahwa seems problematic because of the distance of River Ami from the site. Pali texts say that Buddha left his palace at midnight and crossed Anoma (modern Ami) before morning, but the Ami River is too far from Piprahwa to allow this identification. Another problem is that River Rapti flows between Piprahwa and Ami; thus, in this context, Buddha would have crossed Rapti before Anoma, but Pali texts are silent about this. Similarly, Pippalivana was identified by different scholars with different places. In these years, UP State Archaeological Dept. is excavating Rajdhani, identified by Carlleyle with Pippalivana. This excavation may prove helpful in determining the identification of this site with Pippalivana.

There are dozens of sites which are mentioned in Pali texts, which were located in the Trans-Ghaghra Plain and have not been satisfactorily identified so far. The identifications of these would be possible if an extensive project is undertaking involving collection of literary data, exploratory surveys and archaeological excavations.

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Significant Discoveries around Sudarshan Lake, Junagadh

The Girnar Rock Inscriptions at Junagadh have raised the curiosity of scholars for the last 200 years to identify the Sudarshan Lake mentioned therein. The granite boulder carries an Ashokan Rock Edict as well as two subsequent inscriptions by Rudradaman and Skanda Gupta respectively. This was first reported by Todd in 1822 and was sent to James Princep in 1837 for decipherment. The inscriptions cover over a hundred square feet of the uneven surface of a large rounded and somewhat conical granite boulder rising 12 feet above the surface of the ground and about 75 feet in circumference at the base. The inscription of Ashoka is composed in Prakrit (Pali) and those of Rudradaman and Skanda Gupta are in Sanskrit. All the inscriptions are in Brahmi script.

The information we get about Sudarshan Lake from these inscriptions is as follows: (i) the lake was constructed by Pushyagupta, Provincial Governor in the reign of Chadragupta Maurya, with the waters of Suvarnasikta (Sonrekha), Palasini, and other rivers emerging from Mount Urjavat (Girnar) (ii) the lake was perfected by Tushaspa, Provincial Governor in the reign of Ashoka Maurya, (iii) during the reign of Maha Kshatrapa Rudradaman I, the lake, which was in bad state due to heavy rains and storm, was repaired and beautified, and (iv) later on, the repairing of the lake was carried out during the reign of Skanda Gupta.

Pandit Bhagawanlal Indraji was the first noted scholar to take initiative for identifying the lake. In 1878, he said that the lake must have been situated to the east of Girnar hill, the place known as Damodara Kund. In 1957, Shambhu Prasad Desai wrote in his *Saurashtra no Itihasa* (p. 19) that the site where Sudarshan Lake existed must have been at a place near the temple of Tripura Sundari Devi and Triveni Sangam because at this place Palasini and Sonrekha join. In 1967-6, R.N. Mehta wrote in the Journal of Orient Institute No. 18 p. 27 about identifying certain remnants of an 'Earthen Dam' on the southwestern side of Girnar, almost touching the Khapra-Khodia caves. In 1985, K.V. Soundararajan, in his guidebook of Junagadh published by ASI, described the location of the Rock Inscriptions at the entrance of the valley, around half a kilometre to the east of the town, near the edge of what was once called 'Sudarshan Lake'.

Explorations

In 2000, the author was assigned a project by the ASI (entitled Exploration around Sudarshan Lake) with the objectives of (i) to understand the settlement pattern of early historical period around Girnar, (ii) to confirm the cultural sequence/date of the 'Mud Dam' with reference to 'Sudarshan Lake' and also, (iii) to evaluate the region based on the study of Junagadh Rock edict around Sudarshan Lake (Girnar).

Based on the Study of Rock Edict and Remote sensing maps, archaeological investigations were carried out and these have brought to light early historic inhabitation. While exploring around the ridge of the sloping Girnar hill, streams, undulating land surfaces and valleys, it was found

that there were regular settlements in the four cardinal valleys, namely Hasnapur in the North (Jogania hill), Ramnath in the south (Gadhesing Dongar), Suraj Kund in the east (Datar hill) and Khapra Khodia caves in the west (Rock edict).

It is worth mentioning here that the epigraphs mentioned Suvarnasikta and Palasini as the rivers utilized for the construction of the Mud Dam being nearer, so it must have been near their confluence. The confluence of these rivers is now known as Triveni. As one moves down the stream from this confluence, around 200 meters downstream on the right bank a cutting of earthen embankment was located joining up the end of the Jogania Parvat. It was decided that excavation at this location would help in understanding the mud dam and related material culture.

Excavation of Mud Dam

The dam located at the northwestern side of Upperkot fort is almost touching the Khapra Kodia cave, on the confluence of Somrekha and Palasini stream (Pl.1). The remnant of the dam is about 130 m in length and 22 m in height. It is 95 m wide at the base and 11.35 m at the top. The dam was constructed on the natural sand; stone was used for the foundation to prevent shifting of mud at the back. It is having an excellent workmanship with chisel marks on the stones (Pl.2). Stone was also used in the earthwork, probably for bonding of the mud. The use of stone and earth is also recorded in the inscription of Rudradaman. There is a medieval grave (16th c. AD) on top of the dam.

Archaeological Assemblage from the Mud Dam

The archaeological remains discovered included terracotta objects which include anthropomorphic forms, female figurines, skin rubbers, discs, bangle pieces, shell items, numerous animal bones and silver coin of Chashtana, dateable to 1st c. AD.

A. Ceramic Assemblage

The pottery from the dam is meagre owing to the fact that excavation was confined only to one trench. The wares included Red Polished Ware, sturdy red ware and dull red ware. The dull red ware is not well levigated, few of which are having paintings in black. The shapes included bowls of different forms with variations, vases, dishes, sprinklers and storage jars. The most commonly used ware was the sturdy red ware, and the common forms were bowls, vases and Storage jars. The dull red/cream ware can easily be distinguished from the red-slipped ware based on finish and fine fabric. This industry, alongwith the Red Polished Ware can thus be dated to Post-Mauryan period with the help of epigraphical record and evidence of silver coins.

B. Terracotta Objects

Few specimens of terracotta objects have been recovered, the details of which are as follows: (i) Anthropomorphic figure: A very interesting piece of triangular anthropomorphic form has been recovered. It is made of fine clay and is well baked, although the surface is worn out due to weathering. (ii) Female figure: It is a crude female figurine with plaited hair at back. (iii) Skin Rubber: A rectangular skin rubber with incised designs on it is found.

C. Kshatrapa Coin

The finding of a silver coin, probably of Kshatrapa Chashtana (85-140 AD), is very important in the dating of the Mud Dam (Pl.3). The coin weighs 1.90 gm. On the obverse of the coin is a bust of a king on the right side. While on the reverse are depicted three arches forming a chaitya (hill), surrounded by crescent; beneath the chaitya arch are two wavy lines, another crescent is on the left side with a star on the right. The coin is bordered by dots of which only five are visible. The legend is in Brahmi and Greek character, which is still to be identified properly. Part of the legend reads as 'Putrasa'.

Corroboration of the Inscriptional Evidence

Three facts mentioned in the inscriptions are corroborated by the present explorations and excavation. These are: (i) The construction of a canal in Ashoka's reign: Remains of a canal were discovered adjacent to the Damodar Kund. A place named Sone-nu-Vadi yielded courses of parallel brick structures as those of a canal, 1.5 m apart from each other, dateable to Mauryan period, the bricks measure 48 x 30 x 8 cm. (ii) Beautification of Sudarshan Lake: On the foot-hills of Jogania hill, approximately 200 m away from the Mud Dam, was identified a 90 m portion of a stone embankment, running north-south and parallel to eastern bank of Sonrekha river. These remnants seem to be the remains of either repairment or beautification of the Lake. (iii) Discovery of a *panthesu kup* (well for travellers) as mentioned in Ashokan inscription: A line in the Ashokan edict is that 'along the roads, wells should be dug and trees planted for the well-being of men and animals.' The discovery of a well at Suraj Kund might prove significant in this regard (Pl.4). The circular well, cut into a natural rock, measures 3.5 m in diameter and is provided with a square enclosure. The bricks measure 48 x 33 x 8 cm, 40 x 32 x 9 cm and 42 x 33 x 9 cm. The brick lining was repaired and beautified during the successive periods. The mortar used was lime mixed with clay and the surface given a *chuna* wash. Some of the bricks are having decorations like chaitya, conch mark and figure marks. Habitation from Mauryan to Post - Mauryan period.

Other Significant Discoveries from the Exploration

Nearly 3 dozen sites belonging to early historical period were discovered in this exploration. One of these sites, now called *Jinababa ki Samadhi*, seems to be a site of a stupa of post-Mauryan period. The brick-sizes from this site are 38 x 32 x 9 cm and 39 x 28 x 7 cm.

The second significant discovery made was that of a Vishnu temple (later on transformed into a Siva temple) of Gupta period on the Jogania Hill at a height of 538 m (Pl.5). The discovery was based on the study of the Chakrapalita Inscription of Skanda Gupta (recorded on the same Girnar Rock), which mentions the construction of a Vishnu temple in the 138th year of Gupta Era. The inscription eulogizes the temple site as 'from the Urjavat Mountain, the Lordship shines all over the town'.

The temple site has yielded architectural members like: (i) Scattered bricks measuring 40 x 28 x 5. (ii) Cross from Capital belonging to the Gupta Period. (iii) Lower part of Vishnu sculpture showing *vaijayantimala* and anklets on the legs.

Conclusion

This research work, through the evidence shown above, reflects the water harvesting techniques from the Mauryan Period onwards. It should be mentioned here that when the Sudarshan Lake needed massive repairments in Rudradaman's time, some of his ministers had opposed the costly project. However, the generous and far-sighted King made the repairs possible by spending from his personal treasury. From this study, it was also found that the Lake fell into disuse after Gupta Period; this corroborates Hiu-en-tsang's accounts, who mentions the presence of large Buddhist monasteries near the Urjavat Mountain but not the Lake. In addition, the explorations and excavations have shed more light on the post-Mauryan period settlements showing a degree of maturity in the socio-economic dynamics.

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Excavations at Siyapur, District Kannauj

The Department of Ancient Indian History & Archaeology, Lucknow University, under the direction of D. P. Tewari, assisted by J. S. Nigam, Chanchala Srivastava and Durgesh Kumar Srivastava resumed excavation at Siyapur (27°58'32" N, 79°49'35" E), which is situated at a distance of 14 km from District headquarters of Kannauj. The site is approachable first 12 km by metalled road leading to Tirwa then 2 km by cart track to the left (east) of the road from Radha-Krishna temple situated west of the Tirwa road.

River Ishan flows to the north, adjacent to the site and Siyapur village. The river is meandering and forms a horseshoe lake near the village. The water level of the river is 110 m above the sea level (based on 10 m accuracy GPS reading). It has deep embankments up to 6 meters in height. The section of the river is full of silt, which may be divided into three to four groups from top to bottom: 1. Dark brownish, 2. Calcareous deposit, 3. Yellowish deposit, 4. Blackish deposit. All of this is a recent alluvium deposit. No fauna was recovered out of these sections. The river water is the major source of irrigation. People suck the water of river through tube wells and utilize it for irrigation. The level of ground water is deeper in the area and hand-pumps are bored upto a depth of around 100 meters.

The north and west side of this village is swampy, but it is used for agriculture. During rainy season, the area is flooded and a fresh layer of white band cover is left on the bank of the river.

The Mound

The village is nearly 1.5 or 2 meter high from surrounding ground level and the mound is 6m in height from the village level. The area of the mound is 58 x 40 m (2320 square meter). Only 25 m (east-west) x 6 m (north-south) area is plain and rest is abruptly sloping. But on this plain area is a platform (2.60 x 2.43 m) occupying fragmentary defaced stone sculptures, and a few modern pictures of Durga, which are being presently worshipped by the villagers. Sloping area covers heaps of dung-cakes (*kanda*), which are used by the villagers for burning and cooking food. Mound also bears some trees of *neem*, *chandi*, *renda*, and shrubs. A vertically cut section facing north of the mound has resulted due to rains.

Cuttings

Three trenches namely A1, B2, and XA5 measuring 10 x 10 m each were laid in different parts of the mound (Fig.1). These were excavated up to the natural soil. Trench A1 (Fig.2) was laid on the highest point of the mound and its quadrant I was excavated up a depth of 8.20 meters, which yielded 20 stratified layers comprising of brick structures. These layers were divided into four cultural periods:

IV. Kushan Period

III. NBPW Period

II. PGW Period

I. Pre-PGW Period

Layers 1 to 8 were associated with Kushan Period; layers 10 to 17 represented NBPW Period; layers 18-19 were assigned to PGW Period; and the last layer 20 was determined as a deposit of Pre-PGW Period. Thus, the Kushan deposit was found from top surface to 348 cm below it. Layer 9 was a transitional layer from Kushan to NBPW Period. The NBPW cultural material was found in the 226 cm thick deposit. The occasional occurrence of PGW was noticed with NBPW up to layer 13 and layers 10 to 13 yielded pure NBPW material. The total thickness of deposit of PGW Period was found 34 cm and Pre-PGW 32 cm, which is characterized by Red Ware, Black-slipped Ware and a few sherds of Black-and-Red Ware.

Trench B2 was laid in the eastern portion of the mound below the vertical cut end of it. The objective to lay this trench was to confirm the deposits of the lower levels in detail. Hence, an area of 10 x 2.125 m was exposed. After digging upto 30 cm, it was found with filled material containing early pottery and present day waste material. Under such circumstances, only southern part of the trench measuring 2.125 x 3.0 m was further excavated upto a depth of 45 cm and it yielded the virgin soil in the trench. The material of this locality was discarded as a pit material.

Trench XA5 was laid on the southern end of the mound at a lower level. Its quadrant 1 was excavated up to the depth of 130 cm down to the natural soil. It yielded five layers. The early pottery comprising Red ware, Grey Ware, Orange-red Slipped Ware, Black-slipped Ware, Black-and-Red Ware alongwith some animal bones that were found from the upper levels and continuing upto layer 3. Hence, the layers 1 to 3 were associated with NBPW Period. The occurrence of NBPW in this collection was very poor. Layer 4 yielded red ware, orange-red slipped ware, black-slipped ware, grey ware, Painted Grey Ware, and animal bones. The total thickness of the habitational deposit of this period was identified in a single layer of 28 cm. Further, layer 5 yielded mostly red ware and few pieces of Black-slipped Ware from its upper strata. This layer was assigned to pre-PGW period.

Chronology

The excavations at Siyapur represented the evidences of four cultural periods dating from pre-PGW to Kushan Period. Normally the archaeological date of PGW in Ganga valley is assigned to a time bracket of 1100 BC to 500 BC. But the present evidence at Siyapur yields a very thin deposit of this culture, which is in between 28 to 34 cm. This deposit is found on the upper level of pre-PGW deposit and has a chain link with NBPW period. Hence, it is very difficult to assess the exact date for this cultural period. It is hoped that in around 1200 BC the first settlers of pre-PGW period occupied this place and continued up to Kushan period. There might be the evidences of post-Kushan period which was totally washed away from the mound.

The charcoal samples collected from the lower levels of trench A1 have been sent for radiocarbon dating to Birbal Sahni Institute of Palaeobotany and the results are awaited.

Structures

No evidence of structural activity in periods I, II and III were noticed. Only a working floor with a burnt patch was found in the transitional layer (9). It was well-recorded in period IV at the site. Trench A1 yielded a floor built on layer 8 and sealed by layer 7. It was made with rammed earth mixed with potsherds. Its extant remains measured 4.25 x 3.10 m and its thickness was 10 cm. Total six brick structures were exposed in this trench.

Structure 6 was a wall (3.16 x 36 m) made of burnt bricks (36 x 23 x 5 cm and 34 x 22 x 5 cm). These were laid in mud mortar. It was built on layer 6 and was sealed by layer 5. Its nine courses were found in situ. The debris of this wall is lying between layers 6 and 5.

Structure 5 was also a wall (80 x 52 cm) attached to section facing east. Its four courses were found laid with mud mortar. The size of bricks used in it was 26 x 21 x 6 cm and 23 x 20 x 5 cm. The contemporary layer was layer 5.

Structure 4 was also part of a wall running east to west measuring 25 x 95 cm, made of burnt bricks (22 x 15 x 5.5 cm) with mud mortar. It has retained 3 courses only.

Structure 3 was a part of a wall running east to west containing 6 courses made of burnt bricks measuring 34 x 23 x 5 cm, 28 x 21 x 5 cm, and 22 x 15 x 4.5. The bricks were laid in mud mortar. It was built on top of structure no 6; its contemporary layer was 5 and was sealed by its own debris.

Structure 2 was a part of small-sized room, of which three walls were exposed. The extant measurement of the structure was 2.92 x 1.38 m. These walls were made of burnt bricks measuring 37 x 20 x 5 cm, 27 x 20 x 5 cm and 24 x 18 x 4 cm with mud mortar and were laid in headers and statures. The thickness of the walls varied 50 to 55 cm. It was built on the top of layer 6. Layer 5 and debris were contemporary deposit and layer 4 sealed it. The extant height of the structure was 129 cm containing 24 courses. The lime and rubbish were found in the inner portion of the structure.

Structure 1 was part of a wall (2.29 x 1.09 cm) running east to west, made of kiln-burnt bricks with mud mortar. The size of bricks used in this wall was 34 x 20 x 5 cm and 34 x 21 x 5 cm. It was built with full-sized bricks as well as brickbats. The bricks were laid in headers and statures in English bond. The wall was built on the top of layer 4A. The layer 4 and 3 were contemporary deposits and layer 2 sealed it. A total of 8 courses were found in situ.

Pottery

Period I yielded red ware, both dull and slipped; black-slipped ware, black-and-red ware and dark grey ware in thin fabric. Bowls, basins and dishes in medium and fine fabrics represent red ware. The shapes found in dull red ware are restricted only to vases. Dishes and bowls are found in black-slipped ware, a dish was found in grey ware while shapeless sherds represented the black-and-red ware. A shapeless sherd in dull red ware was decorated with rope pattern in appliqué.

Period II yielded a shapeless sherd of PGW, which was a part of dish bearing two strokes inside; bowls in fine grey ware; dishes and bowls in black-slipped ware; orange-red slipped ware and red-slipped ware; vases, handis, and jars in dull red ware. One sherd decorated with knuckle pattern in appliqué was also found.

Period III yielded Northern Black Polished Ware in steel blue hue; fine grey ware; a dish in dark grey ware; bowls and dishes in black-slipped ware; collared bowls, basins, and dishes in orange-red slipped ware; bowls, basins, dishes and vases in red-slipped ware; and vases, jars and handis in dull red ware.

Period IV was represented by red ware, black-slipped ware and grey ware. The shapes comprised bowls, handis, vases, basins, spouted vessels, lids and jars in red ware, bowls and vases in black slipped ware and bowls in dark grey ware.

Antiquities

Seventy-six antiquities of terracotta, bone stone and metals were recovered from the excavation and these can be clarified as under: Period I yielded pottery hopscotch, terracotta ghat-shaped spindle whorl, fragment of a stone pestle, fragment of an iron object. Period II yielded pottery hopscotch's, terracotta *ghat*-shaped spindle whorl and aricanut shaped bead. Period III yielded pottery hopscotch's, terracotta *ghat*-shaped spindle whorl, ghat-shaped beads, discs, dabbers, fragment of a toy cart wheel, fragment of an animal figurine, fragment of a terracotta bracelet, stone bar, cylindrical micro bead, glass beads, antler, fragment of a bone point, shell, copper antimony rod, terracotta bracelet, bangle, fragment of an iron nail, fragment of a spear head, and fragment of a knife. Pottery hopscotch, terracotta discs, marble, wheel, spherical micro beads, bangles, dabber, ear-stud, toy cart wheel, aricanut shaped bead, terracotta male head, human and animal figurine, *kauris*, shell, bone arrowhead, fragmented iron nails, broken stone sculpture and a male head were found from Period IV.

Faunal Remains

Prof. G. L. Badam, Joint Director of M.G.M. Museum, Raipur (Chhattisgarh), studied the faunal remains found from the site. A large number of fragmented bones were collected from the excavations. Cut marks and charring effect is seen on the surface of these specimens. Among these specimens, the bones of wild and domesticated animals were identified. These animals were *Bos indicus*, *Bos bubalus*, bovids, medium and small-sized mammals, *Sus scrofa cristatus*, *Axis axis*, Turtle and Reptiles. The detail study of these specimens is due, which will be conducted further.

Botanical Remains

Dr. Chanchala Srivastava of Birbal Sahani Institute of Palaeobotany, Lucknow collected by floatation technique the seed samples from Kushan to Pre-PGW levels. She identified some type of grains in the said period. Among these, some samples of Pre-PGW and PGW periods are given below.

Pre-PGW Period: Cereals: Rice and Barley. Millets: *Ragi*. Pulses (Legumes): *Moong* (Green Gram), *Urad* (Black Gram), *Masoor* (Lentil) and *Moth* (Aconite Bean), *Kulthi* (Horse Gram). Fruits: *Ber* (Wild Jujube). Weeds and wild Taxa: Wild Grasses - Blue steem grass, wild oat, sawan. Goose grass - *Tulsi*, Chino/ams (Bathua etc.), wild indigo and number sedges, Day-flower Faint, Night shad, Ticklover, Panicum grass, Hairy Indigo.

PGW Period: Cereals: Rice and Barley. Millets: Ragi, Kodon. Pulses (Legumes): Moong (Green Gram), Urad (Black Gram), Masoor (Lentil) and Moth (Aconite Bean), Kulthi (Horse Gram), Pea. Weeds and wild Taxa: Wild Grasses - Crowfoot grass, Blue steem grass, wild oat, sawan. Goose grass - Tulsi, Chino/ams (Bathua etc.), wild indigo and number sedges, Day-flower Faint, Night shad, Ticklover, Panicum grass, Hairy Indigo, Khesari (Grass pea), Piazi. Fibre Crop: Semal (Silk cotton tree).

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Excavations at Sanchankot, District Unnao, U.P. (2004-05)

The river Sai, a tributary of Gomati, originates near Karawan in Shahjahanpur and passing through the districts of Hardoi, Unnao, Lucknow, Barabanki, Sultanpur, finally joins the river Gomati in the district of Jaunpur (Baghel 1979). A number of sites are reported on the banks of river Sai from its origin to meeting point at Gomati. There are at least 5 big ancient settlements lying on the bank of Sai in Unnao District, viz., Sanchankot, Mohan, Asoha, Simri, and Ajagaon. During the field season 2004-05, a small-scale archaeological excavation was carried out at Sanchankot (Ramkot) and the results inspired us to continue excavations for next three seasons.

Sanchankot (26°59'10"N; 80°19'50"E) is situated in the revenue village of Ramkot in Safipur Tehsil of Unnao District on the Sandila-Bangarmau Road on the right bank of river Sai. There are a dozen mounds of different sizes and heights, very close to the main mound of Ramkot, lying in the villages of Auramau, Sukhankhera, Khambhamau, Behta, Natkhera and Jalesar. These are scattered in an area of nine square kilometers. Amongst these, three are prominent in size, with a height of about 16 meters from the surrounding ground level. Near the Ramkot mound, river Sai (ancient Syandika) makes a bend and washes two faces of the mound on north and the west side. The mound basically consists of the remnants of a stupa, which was destroyed by local brick-robbers. At present, only brickbats are littered here and there and a heap of the soil of the *andabhag* of ancient stupa is remained.

During the course of the surface exploration of the mound, ceramics of glazed ware, red ware, black-slipped ware, NBP Ware, Black-and-Red Ware and PGW were found. Earlier OCP was also reported from the mound (Shukla 1986). There are two temples on the mound, one of Chaimidevi and the other of Mahavir. Every year, a fair is held here on the full moon day of the month of Chaitra, in honour of Chaimidevi.

The Research Problem

Traditionally, it is believed that Rama, the King of Ayodhya of the Ikshvaku dynasty, organized an Ashwamedh sacrifice at Naimisharanya and left the horse from here (Pargiter 1997). Lava and Kusha, who were residing in the Valmiki Ashram at Bithur, restrained it (Vrindavan Das). After the defeat of the defence guard in battle, King Rama himself came here to secure the release of his captive sacrificial and made a military camp at this place; consequently, the place came to be known as Ramkot after his name. Secondly, Sanchankot, formerly known as Shantamukot, is believed to be named after King Shantanu of Mahabharat (Pargiter 1997).

The district of Unnao, for many years now, has been the study centre for many archaeologists. Some of them have concentrated their study on Sanchankot (Ramkot). A. Cunningham, after his visit to Sanchankot reported that, "The great mound of Sanchankot (or Sujankot) stands on the right or south bank of the Sai River, about half-way between Bangarmau and Sandila. The river makes a bend and washes two faces of the mound, which is generally

known as *Kilah*, or 'the fort'. Out of 52 coins, which were found at Sanchankot, there were no less than 45 old Indian, 2 Indo-Scythian of Huvishka, and only 5 of Muslims. The Hindu coins were of the oldest known kinds, both punch-marked and cast. It is certain, therefore, that the site was occupied as early as 500 BC, and perhaps much earlier" (Cunningham 1880).

A. Fuhrer in his work *The Monumental Antiquities and Inscriptions in the North Western Provinces and Oudh* expressed his view that "there can be no doubt, it was occupied at a very early date." He further says that, "the place is unquestionably a field of great promise, for the buildings, though covered, are becoming exposed by the action of rains and a thorough explanation would not be difficult. Large hoards of ancient Hindu coins comprising of Buddhist punch-marked and cast silver bits, Indo-Bactrian, Indo-Scythian, and Gupta coins are constantly dug out by the villagers during their search for bricks. Interesting fragments of stone statues and terracotta figures, both Buddhist and Brahmanical are scattered about over all the mound" (Fuhrer 1891).

Karuna Shankar Shukla extensively explored the district and analyzed the surface data (Shukla 1982). Nalinaksha Dutta, Rhys Davids, K.D. Bajpai and A. Lal have also discussed the significance of the site. The U.P. State Department of Archaeology has also surveyed the mound during the field season 1984-85 under the leadership of Amar Singh and Rakesh Srivastava and reported glazed ware, red ware, NBP Ware, grey ware along with brick structures. Finally, the U.P. State Dept. of Archaeology protected the site, which is now a part of the Reserve forest covered with planted babul jungle.

Objectives for this Season's Work

Keeping in view the traditional and historical importance of the site, exploration and limited excavations, in the field season 2004-05, in Sanchankot was done by the Dept. of A.I.H. and Archaeology, Lucknow University, under the direction of D.P. Tewari with cooperation from J.S. Nigam and assistance from D.K. Srivastava, S.K. Chaudhary, Pramod Kumar, S.N. Yadav, Arvind Tripathi, Rajesh Tripathi, B.K. Pandey and A. Mishra with the following objectives:

1. To ascertain the antiquity of cultures in Sai Valley.
2. To trace the structural activity from earliest times to the medieval period at Sanchankot.
3. To ascertain the plan of the city of Kushana and Gupta period at Sanchankot.
4. To identify the important places narrated in the travel accounts of Fa-Hien and Hiu-en-Tsang.
5. To identify the Buddhist monuments of the nearby areas of Sanchankot.
6. To give a clear picture of climatic, floral and faunal conditions of Sai Valley.
7. To corroborate the literary data, esp. from Ramayana and Mahabharata, with archaeological facts.

Excavations

Keeping in view the problems related to the site and the extensive area of the mound, three exploratory digs of 1 x 1 m near the village of Lalpur, one exploratory trench of 2 x 2 m in the stupa area, two trenches of 5 x 10 m in 5 steps at Data Ashram, one trench of 10 x 10 m, and four quadrants from three different trenches at Bihari Khera were excavated upto the natural soil. In addition to these, scientific cleaning of a temple of Pratihar period in village Khambhamau was also taken up. These excavations yielded a cultural sequence of five periods as under:

Period V: Rajput Period.

Period IV: Gupta Period.

Period III: Sunga – Kushana Period.

Period II: NBPW Period.

Period I: PGW Period.

PGW Period

It was observed that the remains of the earliest cultural deposit of PGW Period were localized in the central part of the mound; however, traces were also found in one of the exploratory trenches (Tr. T 7), which yielded a 1.50 m thick deposit overlying on the natural soil. It yielded Painted Grey Ware, fine grey ware, Orange-red Slipped Ware, Black-and-Red Ware, black-slipped ware and red ware. The shapes represented are bowls, legged perforated bowls, dishes, basins, channelled basins, miniature basins, jars and a few miniature vases. The painted motifs on PGW are executed with black/brown pigment. Such designs were also noticed on the dishes of Orange-red Slipped Ware also. Another trench, Tr. T4, also yielded few tiny sherds of dishes in two consecutive layers (layers 28 and 29). Antiquities included terracotta beads, discs, copper objects and iron slag.

NBPW Period

The period II at the site was identified as NBPW culture represented by Northern Black Polished Ware, Orange-red Slipped Ware, black-slipped ware, grey ware and red ware along with iron nails, copper objects, terracotta human and animal figurines, beads, hop-scotches, wheels, stamps, spindle-whorls and a few bone points. Remains of a wall was found running east to west. Its extant measurements were 11.80 m (length) and 5.60 m (width). This was built of kiln-burnt bricks in different sizes (51x 31x 8cm, 52 x 28 x 7.5cm, 54 x 29 x 8cm, 53 x 30 x 8cm and 50 x 29 x 8cm). The bricks were laid in mud mortar in English bond. Total 40 courses of this structure were exposed successfully, but the lowest course of the wall could not be traced due to sub-soil water, which appeared during the course of excavation in lower levels. These seem to be the remains of a rampart of the Mauryan period. Another interesting brick wall, running north to south was also found in this locality (brick size 54 x 28 x 7 cm), which retained 32 courses laid in mud mortar. Its extant measurement was 2.06 m x 0.86 m.

Sunga-Kushan Period

The richest deposit of 5 to 6 meter thickness was ascribable to the Kushana Period, represented by red ware, both dull and slipped. The shapes occurred are bowls, nail-headed basins, vases, miniature vases, button-knobbed lids, spouted vessels, *handis*, troughs, jars and storage jars. Stamped designs were found on some of the potsherds. The terracotta objects include human and animal figurines, aricanut-shaped beads, dabbers, skin rubbers, pendants, wheels, toy carts, and a good quantity of archaic terracotta human figurines, gamesman, stamps, seals and sealings, net sinkers, tablets, crucibles, ivory bangles, shell bangles, shell beads, copper collarium stick, iron and copper objects and also copper coins of Kushana Period. One of these coins is very clear and bears the standing figure of a king making offerings into fire on the obverse and Shiva with *nandi* on the reverse of the coin, which may be associated to Wima Kadafises of the Kushana dynasty. Stone pestles, beads, and terracotta roof tiles were also recovered from this period.

It is pertinent to mention here that a trench laid on Jaleshar mound near a banyan tree yielded 7000 archaic terracotta figurines, kept in a heap in a room made of burnt bricks of the Kushana period. A number of Kushana bowls were also recovered from this house, which indicate it to be a potters house or shop near an ancient temple complex. The salient features of these archaic terracotta figurines are as under:

1. These are made with fine-grained and well-levigated clay.
2. Husk and straw particles are used as tempering material in preparation of the clay.
3. All these were hand-made; no mould was applied in its modelling.
4. The heads of these terracottas were diffused and no headdress is seen on any of them.
5. The presentation of the forehead is not seen on the figurines.

6. Eye brows are also absent.
7. The eyes are made with a simple method of pinching with a pointed instrument, which left a narrow hole representing eyes.
8. Nose and mouth were shown in the form of a ridge elevation, made by pressing the clay by fingers. Both the lips were separated by a horizontal cut.
9. The chin is absent in all the figurines.
10. The neck is abnormally thick and featureless.
11. The shoulders are also not prominently projected.
12. Both the hands are very tiny and horizontally projected without differentiating ulna from radius.
13. Almost all are palm-less. Sometimes it is represented by few (one or two) incised horizontal lines.
14. A few of these figurines do not show the naval portion, but other specimens have a naval made by pointed incised marks leaving a small hole below the flat stomach.
15. Both the legs are made at 45 to 135 degrees by pressing the clay with two fingers. They are pointed but blunt on the top. In some cases, the foot is represented with one or two oblique incised lines.
16. A few of these figurines bear the phallus symbol representing males and breasts in the case of females.

A circular terracotta seal with a knob, bears a *shivalinga* with a trident on the left and *dhvaj* on the right with Brahmi alphabets of Sunga-Kushana period (Kalanjar pith). Another seal, made of bone, has a peacock figure on the top and a legend in Brahmi below.

The structural remains of this period have four phases. All these are made of kiln-burnt bricks laid in headers and stretchers in mud mortar. Different sizes of bricks used in these structures are 39 x 24 x 6 cm, 37 x 22 x 6.5 cm, 36 x 21 x 5.5cm, 35x 23x 6.5cm and 33x 22x 6.5 cm. The walls containing 63 courses were exposed intact in one of the trenches (Tr. T4). It is interesting to note here that the same wall was used in another structural phase by adding few courses. The floors of the houses were made with rammed earth. Brick paved floors were also found. The drains were made with fired bricks and finished plaster.

At one level, few of the houses were full of charcoal. In other cases the walls were also burnt. There were also deep cracks suggesting the possibility of a massive earthquake and fire activities at the site, which may be responsible for the destruction of this town.

Gupta Period

The deposit of Gupta Period (Period IV) was found limited in the upper two layers in one of the trenches (Tr. T 4). Rest of the material of this period was recovered from a deep pit sealed by humus. It yielded moulded pottery in red ware along with other terracotta antiquities. The brick structures of this period were made by reused bricks of the earlier period. A terracotta sealing was found, bearing a figure of a sitting lion with raised head and legend in Brahmi below. B.P. Roy has reported similar type of a sealing, from a pit of the Gupta period from the excavations at Maner.

The medieval and late medieval deposits could not be confirmed during this season's work, although we collected glazed ware in exploration.

Pratihara Period Temple

In village Khambhamau, on the northwestern corner of the site, a temple of Pratihar period made of kankar stone slabs was exposed. The size of the base of the temple was 7.40 x 8.0 m. A few sculptures, viz. Vishnu in standing posture with attendants and worshipers, flying Vidyadharas and other damaged female figurines were discovered. Also, part of *bhumi amalak*, pillars decorated with chain and bell, *ghatpallava*, part of a lintel, and a drain on the platform was found.

Summing Up

The faunal and palaeobotanical material recovered from surface collection is under study for a clear

interpretation of the palaeoenvironment of the area under study. The archaeological importance of the site has undoubtedly been established during this year's exploration and focussed excavation; however, the numerous academic and archaeological problems related to this site demand immediate attention. Hopefully, in the following seasons of excavations and explorations, we will be able to solve some of the questions raised regarding the historical importance of the site.

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Excavations at Naurangabad, Haryana – 2000-01

The ancient site at Naurangabad is under the protection of the Archaeological Survey of India and is located 10 km to the east of the district headquarters of Bhiwani on the Rohtak road. The nearest railway station, Bamla, lies about 3 km from the site.

The mound is very large, measuring about 58 acres and is almost rectangular in shape. It has a habitational deposit of about 11 m high and the mound stands out distinctly from the surrounding cultivated fields, as the contour rises from 217 to 228 m from M.S.L. The top surface of the mound is almost plain. Geographically, the site lies adjacent to the dune areas of Rajasthan. On the southern side of the site, the landscape is characterized by a number of fossilized sand dunes. The site is located at a distance of about 100 km west of river Yamuna on its old channel bed. The eastern part of the mound is presently under the occupation of the local villagers, who have extensively robbed the burnt bricks from the ancient structures of the site and used those for the construction of their houses. This has caused considerable damage to the site. As a result, the upper habitational strata alongside structural remains at the site are badly disturbed. Survey carried out in the area has revealed that nearly sixty per cent of the modern houses of nearby villages i.e. Naurangabad, Dhani, Bamla, etc. are constructed from bricks removed from this mound.

Objectives and Layout

The main objective of the excavation was to ascertain:

1. The cultural sequence at the site.
2. To study the town planning of the historical city at different levels under the Yaudheyas and Kushanas.

With this view, seven trenches (10 x 10 m) were laid out at three different places on the mound. Of these, five trenches (XP 19, XQ 19, XR 19, XS 19 and XT 19) were laid on the southwestern slope of the mound between the contours of 224 and 219 m almost touching the bottom of the mound. These five trenches were laid in order to ascertain the cultural sequence at the site. The sixth trench (ZH 8) was laid at the level of 226.53 m, on the middle of the mound, whereas, the seventh one (ZS 25) was taken up on the northeastern side of the mound about 3 m below the previous one at the level of 223 m. The Trench ZS 25 was laid at the place where unauthorized digging took place in recent years exposing some of the historical structures. Due to unavailability of space, probing was done only in two quadrants to find out the cultural sequence at the site. Quadrant 4 of XP 19 yielded a habitational deposit of 6.55 m above the natural soil in which 15 layers have been noticed. In Qd. 1 of ZH 8, the excavation could be carried out only up to a depth of 6.15 m, in which 18 layers have been encountered. Further digging could not be carried out in this quadrant due to lack of space as a number of structural remains were encountered, but it is presumed that at this area the cultural deposit might be around 9.0 m.

Stratigraphy

The only trench (Trench XP 19, Qd. 4) in which excavation has been carried out up to the natural soil has yielded 15 layers with a total deposit of 6.55 m. The total

thickness of layers from 15 to 11 is 2 m and has been ascribed to Period IA. Layer 15 is light greyish in colour and compact containing a few potsherds. It is resting over the natural sediment into which digging continued upto a depth of 1.10 m. Layer 14 is greyish in colour and is comparatively less compact than the previous layer and contains patches of burnt earth and ash. Layer 13 is dark greyish in colour and is compact. This deposit contains both charcoal and ash. Layer 12 is greyish in colour and coutains compact sediments with ash bands. The layer 11 is characterized by light greyish compact sediment, with a patch of ash at the middle of the deposit.

The total thickness from Layer 10 to 7 is 1.80 m and has been ascribed to Period IB. Layer 10 is greyish in colour with loose sediments, ash and charcoal. Layer 9 has greyish loose sediment with regular bands of ash and charcoal. Layer 8A is greyish in colour and less compact. It has bands of ash deposits, charcoal patches and burnt soil. Layer 8 is characterized by greyish compact sediments with potsherds. Layer 7 has light greyish compact sediments with ash patches.

The total thickness from layer 6 to 4 is 1.15 m and has been ascribed to Period II. Layer 6 is dark greyish in colour and less compact, and also contains charcoal. Layer 5 is light grey in colour and less compact. It contains good amount of charcoal. Layer 4 is light greyish in colour and is less compact.

The total thickness from layer 3 to 1 is 1.60 m and has been ascribed to Period III. Layer 3 has reddish sediment, which is less compact and contains brick jelly and brickbats. Besides, an evidence of a ghost wall has also been encountered from this deposit. Layer 2 is marked by a brick floor. Layer 1 is greyish in colour and has very loose ashy soil that contains brickbats and pottery.

Cultural Sequence

The preliminary study of the cultural assemblage and structural remains unearthed during the excavation in the present field season at Naurangabad has tentatively indicated a sequence of three cultural periods namely Period I, Period II and Period III. Further Period I has been divided into two sub-periods viz. Period IA and Period IB.

Period IA

This period is indicated by a deposit of about 2 m over the virgin soil and is marked by layers (15) to (11) in Trench XP 19, Qd. 4. From this quadrant a U-shaped hearth, a mud brick wall having seven courses and a solitary evidence of posthole have been found. Associated with these structures a copper coin has been recovered. Besides, on the southwestern slope of the mound a mud-brick fortification wall of about 9 m long has also been exposed in Qds 1 & 4 of Trench XS 19.

Period IB

This period is represented by a deposit of about 1.80 m and is marked by layers (10) to (7) in Trench XP 19, Qd. 4. A mud-brick wall with three courses of a room has been noticed from this level. At the southwestern slope in Qds 1 & 4 of Trench XS 19, a burnt-brick retaining wall for strengthening the earlier mud-brick fortification of sub-period IA has been unearthed at the periphery of the ancient city. The size of burnt bricks used in the retaining wall is 48 x 24 x 7 cm. The heavy debris of the retaining wall was found scattered mixed with the silt in the neighbouring Trench XT 19, upto a depth of about 4 m below the base of the said wall in a ditch. The sudden fall of the debris mixed with silt at the lower level as found in Trench XT 19 suggests that the ditch, in which the debris has fallen, might be a moat surrounding the fortification wall. However, further probing is required to confirm the existence of a moat. A terracotta plaque with male figurine, a terracotta horse figurine with a saddle and *ghat* shaped beads are some of the important findings of this period.

Period II

It is indicated by a deposit of about 1.15 m, marked by layers (6) to (4) as noticed in Qd. 4 of Trench XP 19, at the southwestern slope. Whereas, at the middle of the

mound in Qd. 1 of Trench ZH 8, this period is represented by a deposit of about 2 m and is marked by layers (14) to (7) in which several floor levels have been encountered. A burnt brick structure measuring 1.35 m in width and 0.73 m in height with eleven courses has been located in Qd. 4 of Trench XP 19 and seven courses of a mud-brick wall has been found in Trench XR 19 with a foundation pit. This foundation pit was found to be filled with yellowish sandy soil.

In the middle of Qd. 1 of Trench ZH 8, a mud-brick wall (0.7 m wide, 3.77 m long and 1.65 m high) was found along with a foundation pit. This foundation pit was found filled with yellowish sandy soil and mud brickbats. This wall forms a part of a room measuring 2.32 x 1.97 m. The other walls of the room were also partly exposed. The extant height of the northern wall of this room is 1.42 m, which was found associated with a number of successive floors. Evidence of rubbing of this wall, at the upper portion has also been noticed. There is evidence of subsequent repair of the wall with burnt bricks.

At another place on the northern side of the mound, remains of a house made of mud-bricks have been encountered. Of this house, two rooms have been fully exposed. The size of these rooms measure 2.10 x 2.27 m and 2.10 x 1.63 m respectively, and a 0.98 m wide door. Besides, another room also has been partly exposed. The thickness of the exterior walls of this house is 44 cm, whereas the thickness of the internal wall separating the rooms is 23 cm, which have been built by using single bricks laid in header and stretcher style. Evidence of mud plaster is found on both the sides of the wall of the house. It has been observed that this area is filled with a 3 m thick deposit of yellowish sandy soil, to raise the ground level during successive occupations. This filling material has been scooped out by the villagers in the recent past for plastering their own houses. Besides, a skeleton of a camel was found buried in this house, which seems to be a recent activity. Evidence of a ghost wall is also noticed in Qd. 4 of Trench XP 19 in this period. Copper coins, arecanut shaped terracotta beads, terracotta human heads of Kushana style, a piece of green glazed ware, etc. were found in this period.

Period III

This period is marked by a 1.60 m thick deposit and is represented by two structural phases. A partly exposed house made of mud-bricks and re-used burnt bricks of structural phase I has been noticed. The walls of the house are running from northeast to southwest and northwest to southeast. The exposed portion of the house has two small rooms, eight partly exposed rooms and a chamber measuring 1.87 x 1.08 x 0.95 m. Remains of pure ash, charred seeds, a copper coin, a heavy iron ore piece, etc., were recovered from the chamber. The maximum available height of the wall of the house is about 1.15 m. The thickness of the wall varies between 64 and 66 cm. The remains of the house are scattered in all quadrants of trench XP 19 and XQ 19. The chamber is found in Qd. 1 of Trench XR 19 from where slope of the mound begins downward at the southwestern side of the mound. The burnt brick floors unearthed in all quadrants of trenches XQ 19 and XR 19 covering an area of about 10 x 15 m mark the structural phase II of this period.

Subsequently at a successive stage, a mud-floor of about 15 cm thickness was found laid over the damaged brick floor. Similar mud floor is also recovered in Qd. 2 of Trench ZH 8. The interesting feature of this period is occurrence of ghost walls that has been identified at two places. The thickness of these two ghost walls is about 64 cm and 66 cm respectively. Probably, the bricks were robbed from the walls of the structural phase II in the later period. In recent past, the brick robbing by the villagers for the construction of their houses has destroyed the site badly.

In the ditch area, over the brick debris small to large-sized incurved rim bowls have been collected in large quantity. It seems that the ditch area was used as a garbage pit in this period. A human skull was also found trapped in the silt of the ditch along with the debris. The boundary

wall and the ditch, both seem to have lost their significance in Period III. Copper rings and coins, a gold foil bead, iron nails, terracotta human and animal figurines with a unique terracotta male child figurine sucking his right leg toe, a moulded human face-fragment made of kaolin, an architectural fragment of stone, charred grains in huge quantity are the important findings of this period. The other noteworthy finds include long foot-based incense burners, highly decorated handles and fragments of pottery with moulded and impressed designs and a fragment of an inscribed brick.

Pottery

So far as the ceramic industry of this site is concerned, the red ware predominates. Besides, black-slipped ware also occurs sporadically. Few pieces of moulded kaolin bowls and a piece of green glazed ware of terracotta core have also been recovered. The pottery is both plain as well as decorated. The decorations comprise of paintings in black colour, impressed designs, incised designs and moulded designs. The pottery recovered from the upper levels of the deposit is profusely decorated with different types of impressed designs i.e. circles, circles with spokes and semi-circles, hollow crosses, lotus designs, etc. These designs mainly occur on the shoulder part of the vases and rim portion of basins. The moulded female figurines with folded hands in greeting posture (*namaskar mudra*) found on handles of the vases are noteworthy. The pottery shapes include small to large-sized basins, storage jars in thick and coarse fabric, medium-sized vases in fine fabric, spouted vases, sprinklers with pointed finial and with or without additional hole at the neck, cooking handis, foot based incense burners, lamps with and without handles, perforated pots with small holes, lids with or without central knob, a piece of inkpot type lid, miniature vases, etc.

Antiquities

Amongst the antiquities recovered from the site, mention may be made of terracotta human and animal figurines, terracotta mould of a human face, fragment of a moulded human face made of kaolin, a terracotta miniature figurine of a lion in seated posture, a terracotta toy cart frame, animal toy cart and wheels, fragment of a terracotta votive tank, terracotta tablet bearing chequered pattern in incised design, a *ghat* shaped and arecanut shaped beads of terracotta, beads of carnelian, agate, quartz, crystal and other semi-precious stone and a gold foil bead, stone mullers, iron nails, copper coins, etc.

Surface findings include a terracotta human head, a terracotta seal with legend *Devarupa* in Brahmi, a terracotta mould of human figurine, a terracotta votive tank and few copper coins. Other noteworthy finds from the site include varieties of rectangular, square and wedge shaped bricks. One of the bricks bears a fragmentary inscription *Ati ..... (muktasya)* in Brahmi character of the 3rd c. AD.

Conclusion

The site at Naurangabad falls under the ancient Indian tribal state of mighty Yaudheyas. Yaudheyas resided to the west of river Yamuna. It seems that their powerful military activities pulled out the Kushanas from the area between Yamuna and Satluj in the 2nd -3rd c. AD. From this area, the coins of late Kushan rulers Kanishka-III and Vasudeo-II are found very rarely, whereas the coin hoards of Yaudheyas have been found in plenty. Yaudheyas were notable devotees of the war God Kartikeya as shown on their coins. Kautilya mentioned and counted them in his Arthashastra as one of the Ayudhajivi Sangha. Thus, the site Naurangabad belongs to different phases of mighty Yaudheyas on the basis of copper coins and terracotta seals and sealings with legends like *Yaudheyanam Jaya Ganasya, Yaudheyanam Bahudhanyake, Yaudheyanam Javamantradharanam*, etc., recovered from the site in the past. The above-mentioned objects were found in abundance from the site. The private collectors as well as villagers had collected numerous antiquities in the early seventies from the mound, of which a large collection is now kept in Jhajjar Museum of Haryana. Few coins bearing the legend of *Yaudheyanam* have been recovered during the excavation. However, except the coins, seal and sealings of Yaudheyas, the material culture is no different from the Kushanas.

Further excavations at the site and analytical study of the excavated material are needed to clearly differentiate the cultural assemblage of Yaudheyas. Tentatively, three structural periods could be traced in the limited excavation carried out in this season, which probably belong to early Yaudheyas, Kushanas and late Yaudheyas respectively.

Naurangabad had emerged as a fortified historical town of north India in period I. The water for the ditch and for the town at Naurangabad was most probably feeded by the water flown in through the ancient channel of the river Yamuna.

Archaeological Survey of India

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P.B.S. Sengar

Historical Tripura in the Light of Excavations at Thakurani Tilla, Pillak

Introduction

The ancient Tripura was known as Sukshma Desh or Kiruta Bhumi. According to Rajmala (Chronicle of the Manikya Kings, written during the reign of Dharma-Manikya, 1407-1458 AD), Tripura comprised of a vast territory defined by River Trisanga on the north, Rasanga (Arakan) on the south, Mekhle (Manipur) on the east and Vanga (Bengal) on the west. It shows that the ancient Tripura had occupied a much larger geographical area than at the present. The present Tripura State lies between latitude 22°59' - 24°32' N and longitude 91°12' - 92°24'E in Republic of India. It is a hilly tract with thick jungles and some valleys which allow comfortable human habitation. The important rivers are Gomati, Manu and Howrah. The region is inhabited by numerous tribes like Tripra, Bachal, Duitya Singh, Kuotiya, Seuk, Chhatratiyer, Gafum, Apaichaya, Chilltiya sena etc.

Glimpses of History

The cultural history of Tripura prior to the 6th century AD is hazy and shrouded in mystery as no Archaeological remains were reported so far. However, we have some glimpses of the cultural history of Tripura from the 6th century AD onwards. These show that the people of Tripura in ancient days never remained isolated from the mainstream culture of greater India. The cultural contacts were so intimate and deep-rooted that Hinduism, Buddhism and Jainism flourished in Tripura and followers of these religions lived together in peace and harmony.

In post-Gupta period, this region witnessed the rule of various dynasties like the Naths, the Ratus, the Khargas, the Chandra, etc. The southern and western parts of Tripura were politically attached to Eastern Bengal, the portions of which were known as Samatata, Vanga and Harikela. In the 7th Century AD, this region had acquired fame as a seat of Buddhist learning as the Palas and the Chandras patronized Buddhism. The Chandra Dynasty was more benevolent, as a number of copper plates and coins bear the names of rulers like Gopa Chandra, Dharmaditya, Soma Chandradev, Purna Chandra, Suvarna Chandra, Trilokeya Chandra, Shri Chandra, Kalyan Chandra, etc.

Monks from distant lands like Burma, Ceylon and China used to visit the monasteries in this region. Hiu-en-tsang had travelled in the Northeast India during the seventh century (635 AD) on an invitation from Bhaskar Varman, the king of Kamarupa. He refers to the kingdoms of Radha (North Bengal) and Samatata (Southeast Bengal). He speaks of 20 Buddhist monasteries in Pundravardhana and 30 in Samatata. Among these, the Salvan Mahavihar, with its famous Triratna stupas, in Maynamati in Bangladesh and Pillak in S. Tripura were famous. I-tsing too had visited the region. Tan-kwang, another Chinese Monk, arrived at O-li-ki-lo (Harikela) and lived here until his demise. Chittagong was an important port then, facilitating disembarkment of sea-going vessels. Possibly, Chittagong hill tracts formed the territory of Harikela, as large number of coins with Harikela legends are reported from Pillak, Salvan Mahavihar, Chittagong and Arakan.

Archaeological Investigations in and around Pillak

The credit goes to Samarendra Dev Burman for drawing the attention of scholars to the heritage of Pillak through his article 'Tripura Smriti' published in 1927. The present Pillak, some 80 km southeast of Agartala, is divided into three villages called East Pillak, West Pillak and Central Pillak. Unfortunately, human vandalism and ignorance, in a bid for levelling the mounds to convert them into cultivable land, played havoc resulting in large-scale destruction of priceless heritage of Pillak. In this process, a large amount of sculptures, Bronzes, terracotta plaques were lost and brick structures like stupas, chaityas, etc. were destroyed. The loose Art objects that survived the vandalism were picked up by interested individuals and were either sent to Agartala museum or found their way into private collections. Also, a large number of Brahmanical images were removed from the mounds by the local people and were installed in the local mathas, viz., Muhuripur, Rajeshwari Math, Kalimandir, Basudev Bari, Jagannath Bari etc. These are the only source materials available for the study and researches on this region. The places with known archaeological potential in this area are Shyam Sundar Tilla, Pujakhol, Thakurani Tilla, Ballir Pathar, Vasudev Bari and Sagar Doba Muhuripur. There is an inscription in the monastery of Singthaung, Arakan engraved on a pillar by King Ananda Chandra mentioning Pillak as 'Pilakka-Vanaka'. On palaeographic grounds, this inscription is dateable to 8th century AD.

Excavations at Thakurani Tilla

The mound at Thakurani Tilla (23°25'N, 91°36'E), West Pillak, Belonia sub-Division, Dist. South Tripura, is situated about 52 km south of district headquarter of Udaipur and is approachable through Udaipur-Sobrum Road. The site is a small low-lying mound measuring 3770 sq. m surrounded by paddy fields. The land around the site is mainly deep alluvial deposit of rich fertility with evergreen landscape. A small streamlet flanks the site on its northern side which meets the Mohoripur River on its northwestern extremity.

In 1965, a team headed by S. Banerjee of Directorate of Education and A. Ghosh of ASI inspected the Pillak area. This resulted in the confirmation of the archaeological potential of the area. In the year 1984, three mounds, viz., Shyam Sundar Tilla, Thakurani Tilla and Puja Khol were declared Centrally Protected Monuments by ASI. In the same year, the Bhubaneshwar Excavation Branch of ASI, headed by J. S. Nigam undertook small-scale excavations on Shyam Sundar Tilla. In the same year, the same team undertook excavations on the mound on the southeast corner of the Thakurani Tilla and brought to light remains of a brick temple along with a *pradakshina path* and a partly exposed colossal image of Surya. The results of these excavations were published in *Indian Archaeology – A Review* in 1984-85. There after, there were no further diggings for nearly 15 years, when in 1998-99 the Guwahati Circle of ASI took up horizontal excavations in a grid pattern. These excavations continued for 3 seasons: 1998-99, 1999-2000 and 2000-01 and the results were published in the subsequent issues of *Indian Archaeology – A Review*.

Exposed Structural Remains

A total of 9 structures were exposed in the four seasons of excavations. All of these are brick-built structures with mud used as mortar. Significantly, all these square/ rectangular structures are built in cardinal directions. Among these, Structure I was exposed partially in 1984-85 and fully in 2000-01; Structure II in 1998-99; Structures III, IV, V and VI in 1999-2000; and Structures VII, VIII and IX were exposed in 2000-01 season. With the available sculptural evidence from the structures, it seems that all these shrines were dedicated to Hindu gods, viz., Surya, Ganesha, Shakti (Mahishasur Mardini), Parvati, Shiva and Vishnu. The overall picture revealed from the excavation suggests that the site was plundered by Iconoclasts.

Structure I is a temple basement comprising of *garbhagriha* and *pradakshina patha*. This is surrounded by a square enclosure wall measuring 12 x 12 m with an extant height of 1.15 m. A 10 feet tall colossal image of Surya is found from inside this structure.

Structure II comprises of *garbhagriha* (sanctum) and *pradakshina patha*, which is surrounded by a square enclosure wall measuring 10.2 x 10.2 m. The square *garbhagriha* (5 x 5 m) is having an extant height of 50 cm in ten courses of bricks. The presence of a quartz *shiva-linga* fixed in a sandstone *yoni-pitha* and a miniature votive linga made of crystal suggest that it was a Shiva temple.

Structure III is square on plan (7.5 x 7.5 m), with a central brick platform (3.2 x 3.2 m) surrounded by *pradakshina patha* (1.35 m wide). The brick sizes are 28 x 22 x 8 cm, 22 x 24 x 5 cm, 19 x 14 x 5 cm, 25 x 13 x 5 cm and 23 x 19 x 7 cm.

Structure IV is a square structure measuring 5.6 m x 5.6 m. The thickness of walls is 80 cm and the extant height (6 brick courses) is 45 cm.

Structure V is also a square structure measuring 6 x 6 m with a square platform (1.6 x 1.6 m) in the centre. The platform is bearing a circular *pitha* of 1.20 m diameter fitted with square socket (33 x 33 cm in size). Sizes of the bricks range from 31 x 25 x 6 cm, 29 x 16 x 4 cm and 25 x 19 x 4cm.

Structure VI is a rectangular (6.8 x 6.2 m) shrine. The walls have uniform thickness of 70 cm. The central platform within it measures 2.8 x 3.4 m. The brick sizes are 30 x 22 x 5 cm, 27 x 19 x 4 cm and 20 x 19 x 4 cm.

Structure VII is square on plan. The enclosing wall measures 7 x 7 m with a width of 40 cm. The square platform in centre measures 3 x 3 m and is survived upto a height of 30 cm. The bricklayers were irregular and robbed to a large extent. The brick sizes are 27 x 20 x 5 cm, 31 x 23 x 5.5 cm, 23 x 16 x 5 cm, 29 x 21 x 5 cm and 26 x 19 x 4.5 cm. A 1 m wide *pradakshina patha* surrounds the *garbhagriha*. The base of the structure is slightly tilting southwards.

Structure VIII is square on plan. The outer wall, measuring 6.5 x 6.5 m, has a width of 90 cm with an extant height of 50 cm. There is a square platform in centre measuring 3.5 x 3.5 m. The bricks measure 28 x 22 x 45 cm, 21 x 17 x 6 cm, 30 x 23 x 6 cm, 24 x 24 x 5.5 cm. Some socket bricks of 19 cm and 21 cm radius are also noticed in the outer wall. A passage in between the outer wall and sanctum was filled with brickbats. This temple basement is slightly tilting towards western direction.

Structure IX is a disturbed structure in rectangular shape (6 x 3.5 m). The northern and eastern wall portions are missing. The extant height of the structure is 50 cm with ten courses of bricks. The bricks measure 29 x 22 x 5 cm, 32 x 20 x 6 cm, 28 x 20 x 6 cm, 29 x 22 x 7.5 cm.

Pottery

As per the stratigraphic evidence, pottery from Thakurani Tilla is divided into two main periods: (i) Period I: Post-Gupta (6th-8th c. AD) and (ii) Period – II: Early medieval (9th-12th c. AD).

Period I: The period I pottery is characterized by badly weathered plain red ware mostly found from the earliest level of the period-I. The shapes are sprinklers, globular pots, etc. The globular pots have wide mouths and differing neck heights, the fabric is medium to coarse. The description of a few individual potsherds is as follows. (i) Fragment of a large pot with collar rim, having long neck, grooving on the outer body of rim, thick in section, medium fabric, treated with bright red slip in inner side and partly on the outer body. (ii) Rim of a big *handi*, beaded rim, thin in section, made out of well-levigated clay, well fired. (iii) Rim portion of a medium size *handi*, short vertical neck, slightly out-turned, thin in section, fine fabric, badly worn out. (iv) Fragment of a *lota* with flaring rim slightly projecting towards inner side of the pot. (v) Fragment of a pot having thin section, made out of levigated clay, well-fired, metallic sound, badly weathered. (vi) A fine sherd of red ware having very thin section, metallic sound.

Period II: This pottery is characterized by red-slipped ware, red ware and few sherds of buff ware reported from layer 2 & 3. These are mostly daily-use wares, but in the present context, these might have been used for ritualistic

purposes. The quantity of pottery yielded in the excavation is significantly less than that is normally available in the habitational sites.

Concluding Remarks

The excavations at Thakurani Tilla have brought to light a large temple complex with a prominent Surya shrine surrounded by 8 other shrines containing objects of worship like *shiva linga*, and idols of Vishnu, Mahishasura mardini, etc. All of these belong to Hindu Brahmanical pantheon. The whole temple complex can be dated to 9th-10th century on stylistic grounds. Significantly, simultaneous excavations on a nearby mound, called Shyam Sundar Tilla, have also brought to light a contemporary brick-built stupa. The results of these excavations, combined with the historical data, confirm the fact that Pillak was a flourishing religious centre between 8th and 12th centuries AD where Buddhists and Hindus co-existed peacefully.

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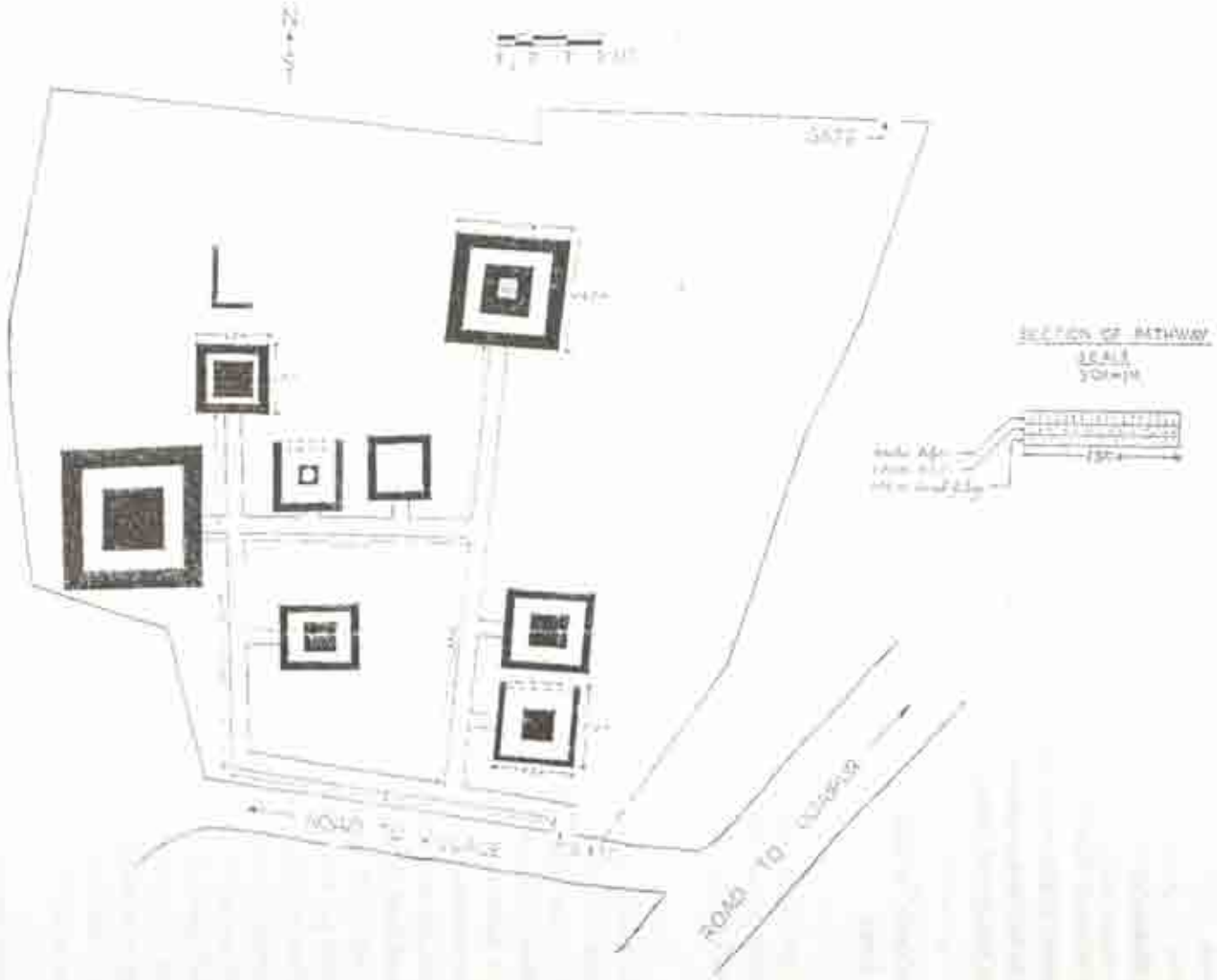


Fig. 1: Site Plan of Thakurani Tila, Dist. Pilak – South Tripura (Tripura)

Shiva's Fury with Special Reference to a Rare Relief Sculpture from Bhubaneshwar

Like the narrative art in the world, the Hindu narrative art has also served its purpose in the propagation of religion (Kramrisch 1981). According to the Hindu mythological stories, Skanda or Kumara was the son of Shiva and quite often Kumara is shown with his parents. However, there is no unanimity among the classical literary texts with regard to the birth of Kumara and his parentage. Generally, the cultic deities are carved either as an independent image in isolation or with the accompaniment of his consort or family members. Accordingly, the images of Karttikeya, who is considered as a member of the family of the Great God Shiva, is carved either independently, or with his parents or consort. But it is interesting to note that there are not many sculptures of Karttikeya either showing or suggesting his birth. In the present paper, it is intended to probe into the issue of the genesis of Karttikeya in relation to the rare relief sculpture, now displayed in the State Archaeological Museum, Bhubaneshwar and to highlight the aspect of Shiva's wrath on Agni in this connection.

As the expressions of human thought and action, both literature and art are so closely knit together that knowledge of one helps understanding the other better. As C. Sivaramamurti remarks, *alamkaras*, as known in literature, have their parallels in art (Sivaramamurti 1974). Among the *alamkaras*, *asambhava* (impossible) is the figure of speech that refers to the occurrence of something unexpected, which could never happen. In the case of the birth of Kumara also, the same thing has occurred. He was delivered not from the womb of Parvati, but was born from Agni. Although the *Puranas* mention that Shiva was the father of Kumara, the same is not mentioned in the Vedic literature (Majumdar 1960). In *Baudhayana Dharmasutra*, we get the early references to Skanda and his various names as Shanmuka, Jayanta, Visakha, Subrahmanya and Mahasena (*Baudhayana Dharmasutra*). In the *Vanaparvan* of *Mahabharata* and in *Ramayana*, the God Karttikeya appears in full-fledged form. In these two epics, Karttikeya, who is generally considered as the son of Shiva and Parvati, seems to have been conceived as the offspring of Agni (Bhandarkar 1928), and not of Shiva and Parvati. In the present paper, it is intended to examine the issue of the parentage of Karttikeya on the basis of both literary and sculptural evidences. In the Indian sculpture, rarely we come across the episodes narrating the genesis of Karttikeya. A fragmentary stone sculpture now exhibited in the Bhubaneshwar Museum contains the story of the birth of Karttikeya, which is highly interesting.

The Birth of Karttikeya according to Puranas

The *Shiva Purana* describes the birth of Skanda in detail and attributes his genesis to lord Shiva (Venkataramanayya 1986). They mention that the Gods who were sorely beset by Taraka approached Shiva with a request that he should give them a commander capable of destroying the demon for which Shiva has agreed. To fulfil his promise, Shiva got married to Uma, the daughter of Himavan, and began to carry out his promise but with ut much success. The Gods and other divine beings lost their patience and sent Agni on their behalf to remind Shiva of his earlier promise to them. Shiva who was then engaged with his wife in privacy was annoyed beyond measure for the intrusion of Agni and discharged upon Agni the semen

intended for Uma's womb. Agni, unable to bear the weight and heat of the semen proceeded to the lake Sharavana (Venkataramanayya 1986). He then fell in love with the wives of the Seven Rishis and penetrated into the wombs of six of them, excepting Arundhati. Thus Agni deposited the seed of Shiva in the wombs of the wives of the sages, who in turn fearing the wrath of their husbands, forcibly ejected the seed from their womb and redeposited it on a lotus leaf in the lake Sharavana. The foetus left by the wives of the Rishis in the lake grew up to be a boy with six heads, twelve eyes and twelve arms. He was named Kumara and he became the commander of the Gods.

In the *Puranas* like *Varaha Purana, Saura Purana, Brahma Vaivarta Purana, Brahmanda Purana, Matsya Purana, Vayu Purana* and *Brahma Purana*, it is mentioned that Shiva cast his seed into Agni (or the seed so fallen was taken up by Agni) who threw it into the womb of Ganges; that the Ganges deposited the seed into a receptacle amongst the Sharavana on the top of the mount Meru, that it was nursed by the six Krittikas and that ultimately the divine child with six faces was born. Since he was born from the discharged seed of Shiva, he came to be known as Skanda. Thus, the *Puranas* generally tally in its details with what is stated in the *Shiva Purana*.

The Bhubaneshwar Sculpture

In confirmation of these descriptive stories on the birth of the Karttikeya, a stone relief sculpture is carved, which is unique and rare in Indian sculptural art (Pl.1). Unfortunately, this is a fragmentary piece of relief sculpture showing only a part of the narrative episode of the genesis of Kumara. In this sculpture, Shiva is shown as seated on an elevated *pitha* with his right leg raised and bent at knee level, while the left leg is folded. Shiva is shown as two armed and his right hand is shown in *abhaya mudra*, while the left hand is placed on the left knee. He is adorned with *yajnopavita, charka kundalas* on his ears and bracelets on his fore arms. The hair is arranged in *jatas* neatly and tied with a topknot. Receding to the background is shown the seated figure of his consort Parvati to the left side of Shiva. Agni is shown as kneeling with his hands held up and palms joined together to form into a hollow in the manner of receiving the semen (seed) from the *urdhva linga* of Shiva. The forceful ejection of the semen into the folded hands of Agni is clearly shown in the relief. Agni is surrounded by flames all over. His body is moderately decorated with *kundalas* on ears, *yajnopavita* and bracelets. He is slightly pot bellied. By his side is carved another seated image of Agni with two hands, right hand holding *akshamala* and the left hand holding a water pot. Like the other figure of Agni, his hair is also arranged with a hair band and flames from top to bottom surround the body. Probably it could be the receptacle in which the seed of Shiva was carefully deposited. In this narrative sculpture, the sculptor has tried to suggest the depth in its composition (Kramrisch 1981). Further, the artist has made an attempt to compose in one horizontal panel the story related to the birth of Kumara. To emphasize the role of Agni in receiving the seed of Shiva and its careful deposition in the receptacle, the figure of *Agni* was carved twice in the narrative sculpture. To the right side of the relief sculpture can be seen a hand with the elbow raised and decorated with *valayas*. It is difficult to identify this figure owing to its incompleteness and mutilation. Probably to indicate that Agni has entered in to the pleasure apartment the design of a door has been carved on the left side of the panel sculpture. Thus, the panel sculpture suggests the intervention of Agni into the private apartments of Shiva in human physical form with flames around his body.

Probably to show that Shiva was the father of Kumara, emphasis is laid in the narrative sculpture to depict Shiva as the central figure seated on the elevated *pitha* ejecting forcefully the semen into the hands of Agni. It is for the first time we come across with an image of Shiva exposing his genitals and at the same time ejaculating his semen (*retas*) into the hands of Agni, although Shiva is shown with his phallus erect (*urdhva linga*) in the iconic forms of Nataraja, Virabhadra, Ardhanarisvara and Harihara. The relief sculpture from Bhubaneshwar demonstrates the fury of Shiva as Agni disturbed him. Further, it also reveals that Shiva was the progenitor of Kumara and that Agni was the vehicle to convey the semen of Shiva to the Ganga.

Discussion

The sculpture under study is a fine example of *asambhava alamkara* in sculpture depicting Agni, in human form, as receiving the semen. The intervention of Agni while Shiva is in love with Parvati and the release of semen by Shiva from his phallus are both sudden, *asambhava*, an unexpected happening that is beautifully translated into the sculptural art form. The mythmakers of the *Puranas* had chosen Agni to transfer the seed to Ganges and then to *rishi patnis*. This selection of *Agni* to contain the wrath of Shiva in the form of semen could have been for the reason that none except the fire God could tolerate the excessive heat and weight generated by the Great God Shiva. It is claimed by psychoanalysis that the preoccupation with loss of semen is the very common source of neurotic anxiety among Hindu men and that can be palliated by eating certain exceptionally good health giving goods of cool types like wheat flour, rice, milk, butter, honey and white sugar, which have the property of building pure, unspoiled semen (Carstairs 1989). In the temples of Shiva, milk, curd, melted butter, honey and white sugar are offered for libations (*archana*) and these are poured on to the upright phallic *linga* that represents the God's creative powers, thus bringing semen and semen foods into conjunction.

It appears that the Hindu view concerning women and sensuality had drawn the attention of the Hindu mythmakers, which in turn was beautifully expressed by the sculptor in stone who must have been aware of the classical literature. Thus, the stone sculpture gives ample scope for a better understanding of not only the Pauranic episode of the birth of Karttikeya but also for analyzing the psychological attitudes, emotional outburst and the unconscious processes in the Hindu personality formation. From the iconographic point of view, this stone sculpture is unique in representing the iconic form of the fury of Shiva in the process of the discharge of his semen into the hands of Agni and in suggesting that Karttikeya was born from out of it, who is justifiably known as Skanda, Agnibhu and Gangaputra. These carvings demonstrate well the role of Agni in the transfer of his energy to the Ganges. Also, this rare piece of art confirms the religious tradition that was popularized by the several *Puranas* in ascertaining the role of Shiva and Agni in the birth of Karttikeya.

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Newly Discovered Gupta Sculptures from Rangpur (Rajasthan)

The current paper aims at lamenting upon some unique and magnificent 4th-5th c. AD sculptures from Rangpur. This is an Early Historic site at a distance of 9 km north-east of Kota and situated on the right bank of river Chambal. The modern village of Rangpur sits upon the ancient mound which shows old scattered remains of ceramics, microliths, slag etc. It is quite interesting that most sculptures are independent ones along with carving on both facets.

Description of the Sculptures

1. Male Figure: The dimensions are - length 46 cm, breadth 19 cm, thickness 12cm. This sculpture is erected on a mud platform, close to a modern temple called *Panchamukhi Hanuman Devalaya*. This sculptural block of stone pertaining to 4th c. AD is carved with two interesting male figures on either side. One of the male figures is in dancing pose while the other one is in seated pose. There is a small tenon of 6.5 x 7 cm on top facet of stone block indicating that it was fixed into something. This sculpture probably adorned the *mandapa* of a temple. The dancing male figure is shown with both hands raised up, holding each other just above the head and legs slightly bent and apart. The ornamentation adds grace to the sculpture. A bordered skirt extends up to knees along with high boots which cover the feet. The muscular anatomy along with prominent eyes, nose and moustache, make the sculpture lively.

On the reverse side of this is a seated male figure (Pl. 1) whose chest and legs had been partly chipped off. A spheroidal headgear which looks somewhat like a cap imparts prominent projection to the head. The lower body portion is covered with a skirt which is up to knees only. He wears high boots. He has a roundish face with broad features like nose, lips, bulging eyes and moustache, along with sturdy body which gives a feel of strength.

2. Male Figure: This chunk of stone belonging to the 4th c. AD measures – length 28.5 cm, breadth 28 cm, thickness 14 cm. It exhibits two dancing male figures (Pl. 2) which share a common back and is presently kept at *Futa Devara*. The head, shoulders, left arm and left leg up to knees had been broken of the ochre-coloured dancing male figure due to vandalistic activity. His hands are clasped across the chest. He wears a skirt which is up to knees and adorned with a plain incised border lining. He wears high boots accompanied with a distinct incised border.

On the reverse of this is another male dancing figure (Pl. 3), which seems to be disfigured intentionally in later vandalism. What we see is a scarf with corrugation hanging along the body on the left side. The skirt dips between the legs which are apart and is decorated with semicircular corrugated lines. A similar pattern of drapery is evinced on the sculptures carved on panels of projected plinth at the Gupta Temple of Deogarh (Vats 1999). This sculpture is carved on a small pedestal measuring 21 x 6 x 4 cm.

The above-mentioned male figures on two separate sculpted blocks are magnificent and spectacular. The adornment of skirt, shoes and headgear of these sculptures is not indigenous. This is a foreign influence which was

practised by Sakas or Indo-Scythians as called by Greek geographers, who inhabited lower Indus country. Their impact percolated down the Indian frontiers and was embraced by Indian art.

3. Female Figure: The dimensions are - length 76.5 cm, breadth 36.5 cm, thickness 30.5 cm. The damsel poses stylishly as one leg bends and rests in the air behind the other one. The thick scarves being blown by air and carving of figures in high relief present an exuberant picture. As mentioned before, these female figures are carved back to back on a light brown sandstone block while one of them is painted with ochre. This damsel (painted one) stands in *tribhanga* pose with her right hand and left leg partly broken.

Exactly opposite to it is another damsel (Pl. 4) whose head, right hand and legs below knees are broken and missing. A bun-shaped headgear, corrugated scarf across elbows and a bowl clasped in left hand add elegance to figure.

4. Female Figure: The dimensions are - length 61 cm, breadth 42.5 cm, thickness 17.5 cm. The sculpture belongs to the 4th c. AD and consists of a rectangular tenon on the top facet. Although the damsels follow a rhythmic manner in their execution but they fail to deliver a sense of completeness due to partial chipping and the missing lower part of the block. The damsel carved on one side is holding some object, probably mirror, with her right hand which bends across the chest and raised close to the left shoulder.

On the back is another female figure (Pl. 5) standing at ease. Her hairstyle is quite alluring. A jeweled head-band holds the hair beautifully above head.

5. *Shalabhanjika*: The measurements are – length 93 cm, breadth 35 cm, thickness 21 cm. The block consists of a small tenon of 8.5 x 8.5 cm on the top face. The sculpture had been carved in light brown sandstone variety. This sculpture (Pl. 6) is unique and a rare masterpiece of its kind known so far from Rajasthan. The *Shalabhanjika* from Rangpur was discovered recently while removing sand from river Chambal. This fact imparts strong base to the viewpoint that temples existed prior to the Gupta period also, but we fail to find any substantial clues to it.

The *Shalabhanjika* at Rangpur dating back to the 4th c. AD is placed on a platform, locally called as *Kheda Khunta ki Mata*. The damsel is shown standing under a *shal* tree which has grown on her right side and spreading itself all above her head. She is standing in a relaxed pose with her left leg behind the right one on a crowned hybrid figure whose head and hands are human where as the hind portion is foliated. The damsel is bending a branch of the tree with her left hand and plucking a flower or fruit with the right one. A scarf with folds hangs along her body on both sides. A *dhoti* of consistent thickness extends almost up to her feet. It is noteworthy that the drapery of damsels at Mathura, Sanghol (Asthana 1985) etc. is diaphanous which is reverse of the style at Rangpur. It may be attributed to regional variation of art. On the left side and below is a figure of a small boy who is looking forward to the damsel as if questioning. A monkey is sitting on the *shal* tree and eating something. A peacock sits on a branch which droops slightly due to the weight, in front of monkey. Another peacock on the right side top corner is sitting and scratching its beak. Besides, there is a squirrel too. No other sculpture of this type has been discovered elsewhere in Rajasthan so far and as such is a landmark in the sculptural art of Rajasthan.

Shalabhanjika means, as the word itself denotes, *bhanjan* or plucking of usually some fruit or flower from *shal* tree, a variety common in the terai region of Nepal. The performer of this act is a damsel or *yakshi* called as *bhanjika*. This theme was quite popular among the sculptors of ancient period, especially those connected with Mathura school of art. Even stupas at Sanchi, Sarnath and other places have not remained untouched by its influence.

6. Dancing Shiva: The measurements are – length 104 cm, breadth 51 cm, thickness 28.5 cm. This sculptural block belonging to the 5th c. AD had been carved with a six-handed dancing Shiva or Nataraja as popularly known, in back to back position. On one side, the head of *Shiva* is broken. He is shown six handed and in dancing pose. This sculpture is presently kept at a place called *Kheda Khunta ki Mata*. The

paradigm of carving sculptures on two opposite facets had not been new to Gupta period. At Mathura, similar sculptures of *Shiva-Parvati* were sculpted back-to-back on the same block.

The other dancing Shiva sculpted opposite to it on the other side comprises of a six-handed Nataraja adorned with *jatamukuta*, big earrings, broad necklace, wristlets and waistband.

7. Door Jamb Fragment: The measurements are - length 150 cm, breadth 33.5 cm, thickness 19.5 cm. This piece of stone pertains to the 5th c. AD and is lying at *Kheda Khunta ki Mata*. It is painted with ochre which conceals the actual surface. It has been carved on two facets i.e. the front and one of the sides on the left with half lotus inside a medallion and a square pattern. The front facet comprises of two niches. The lower niche comprises of a *Pratihara (Padmapani)* figure standing in a pillared niche. The headgear is impressive, comprising of a *jatamukuta* fastened by a jewelled headband. He wears a diaphanous *dhoti* and looks sturdy. The second pillared niche consists of three human figures, one male and two female figures. Both the niches are surmounted with *chaitya* pattern.

Previously Known Sculptures: Besides the sculptural specimens discussed above, we find a *Naga* sculpture (Sharma 1988) and a door jamb (Sharma 1981) at Rangpur which had been taken notice of by previous scholars. A detailed description of them with some new thoughts is desirable for a better understanding of the sculptural heritage at Rangpur.

8. Nagaraja: The *Naga* sculpture (Pl. 7) at Rangpur is an independent one. Its dimensions are - length 94 cm, breadth 40 cm, thickness 20.5 cm. Presently, it forms part of a modern temple called *Sukhrai Srj Maharaja Temple*. This sculpture had been painted with oil-paint as a result of which its original appearence is cloaked.

The *Naga* sculpture stands erect on a pedestal and is two handed. The right hand is raised up in blessing pose, i.e. *vardaksha mudra*. The left hand is positioned downwards holding a spouted water pot. The curly locks of hair extend upto shoulders. A unique jewelled headband adorns the *jatamukuta*. There are two attendants, a male on the right and a female on the left side, near the base. The *Naga* deity is surmounted with a hood of seven serpents which coil behind the deity.

The cult of *Naga* worship was very popular in the art of Mathura during Kushana and Gupta periods. Mathura art centre is a paradigm of this. A temple dedicated to *Dadhikarna Naga* (Joshi 1965) existed on the Jamalapur Tila at Mathura during Kushan period. A number of *Naga* deities exist, not to mention that Balaram too is included in this category, sometimes accompanied with eight pious symbols mentioned in literature like *swastika*, pair of fishes or *matsyayugma*, waterpot etc.

The existing *Naga* sculpture of the Gupta period is equally an important addition to the Naga cult of India, prevailing in this part of Rajasthan during Gupta period and another sculpture of this type will be equally awaited from other parts of Rajasthan.

9. Door Jamb Fragment: Its dimensions are - length 129.6 cm, breadth 56 cm, thickness 20 cm. This door jamb, pertaining to the 5th c. AD, is in dull white sandstone with three vertical bands adorning it. The first band (*rupashakha*) comprises of human figures inside the small niches which measure 29.5 cm by 18 cm on an average. The next band adjacent to this is that of four-petalled flowers. The third band comprises of floral scroll design in semi-circular medallions.

Discussion

The group of sculptures and architectural pieces at Rangpur present a diverse picture of contemporary art style. Foreign influence and indigenous art culture intermingled to create a harmonious balance in art. Through this paper, an attempt has been made to enunciate Rangpur as great art centre, although it had been popular as big trading centre in the ancient times. The ancient trade route beginning from Central India and passing through the famous Gupta centre

of *Mukundarra* (Distt. Kota) (Agarwal 1940), must have crossed Rangpur, which is situated on the right bank of Chambal. After crossing Rangpur the traderoot moved further up passing through Keshoraipatan lying opposite to it on the left bank of Chambal. Exploration on the Gupta site of Darra will be resorted to in the near future.

Acknowledgements

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BOOK REVIEWS

B.B. Lal (with contribution from Palaeobotanist K.S. Saraswat), 2005, *The Homeland of the Aryans: Evidence of Rigvedic Flora and Fauna & Archaeology.* Aryan Books International, New Delhi, Pp. xx + 126, Colour photographs, maps, etc. Price Rs.500/-

This book is the first of its kind, using all kinds of scientific data (zoological, botanical, archaeological, linguistic, etc.), it has convincingly challenged the age-old theory that the Aryans came to present-day India and Pakistan from the cold countries located west of Afghanistan, as invaders and also migrants.

It has three major essays – one dealing with Rigvedic Flora and Fauna and their Habitat, the second, deals with the analysis of the prevailing theories concerning the Homeland of Indo-European Languages and Culture and the third essay deals with the most unethical practice of Michael Witzel, a Sanskritist at Harvard University USA. There are three Appendices also – No. 1 deals with Wood-charcoal samples from some Harappan Sites in Haryana and Punjab (Contributed by K.S. Saraswat). No. 2 deals with the presence of domesticated horse in the Rigveda, and the zoology of this species of the horse (*Equus Caballus* Linn.). No. 3 deals with *Vrishabha* or humped bull (*Bos Indicus*) in the Rigveda and the Art and Archaeology of India. The text follows a very useful select Bibliography.

The book begins with Introduction which logically leads to the evidence of Flora (Chapter II) and Fauna (Chapter III) and its bearing on the Aryan Homeland debate (Chapter IV).

Lal begins with the refutation of the many theories recently echoed by Gregory L. Possehl, a protagonist of the western origin of the Rigvedic Aryans. Lal observes (1) "The earliest known book of the Aryans, viz. the Rigveda, does not mention any of the species of cold-climate trees so confidently enumerated by Possehl and (2) on the other hand all the species of trees mentioned in this earliest text of the Aryans belong not to a cold climate but to a tropical one. The provenance of these trees does not go west of Afghanistan and is by and large confined to India, Pakistan, Bangladesh with a spill over to Sri Lanka, Myanmar and South-east". Lal and Saraswat (the

Palaeobotanist) have noted as many as seven trees mentioned in the Rigveda and their provenance. They are:

Trees

(1) ***Asvattha (Ficus religiosa)***
RV I.135.8; X.97.5. It is popularly called *Pipal* and is found in South and South-east Asian countries. *Pipal leaf* is abundantly found depicted in the Indus-Saraswati art from Early Harappan times to the Late Harappan times at sites like Mundigak in Afghanistan through Harappa, Mohenjodaro, Rehman Dheri, Kot Diji, Kunal, etc. in Pakistan and India.

(2) ***Kimsuka (Butea monosperma)***
RV.X.85.20. It is popularly called in Hindi Palasa/Dhaka with red flowers. It is found in India, Pakistan, Sri Lanka and Myanmar.

(3) ***Khadira (Acacia catechu* Willd.)**
RV.III.53.19. It is popularly called *Khair*. It is found from the Indus (in Pakistan) eastward only.

(4) ***Nyagrodha (Ficus benghalensis* L.)**
RV.I.24.7. It is popularly called in Hindi *Bargada*, and in English 'banyan'. Though the name does not occur, the detailed description given here makes it clear that the composer of the hymn meant it to be the banyan tree alone. It is found from Jalalabad in Afghanistan to Sri Lanka.

(5) ***Vibhidaka/Vibhitaka (Terminalia bellerica* Roxb.)**
RV.VII.86.6; RV.X.34.1. It is popularly called in Hindi *Bahera*. It is found in all the countries of South Asia.

(6) ***Salmali (Bombax ceiba: Samalia malabarica)***
RV.VII.50.3; RV.X.85.20. It is popularly called in Hindi *Semwala* or *Senbhala*. It is found from Pakistan in the west to Sumatra in the east.

(7) ***Simsapa (Dalbergia sissoo* Roxb.)**
RV.III.53.19. It is popularly called in Hindi *Sisama* It is found from southern Afghanistan and eastern Iran, touching Afghanistan, to Assam. Charcoal pieces of the wood of this tree are found at the Indus-Saraswati sites of Kunal (Early Harappan levels) and Rolura and Banawali (Mature Harappan levels).

Plants and Grasses

Lal has also given similar details about the plants and grasses mentioned in the Rigveda and their provenance which is also tropical. For example, (i) *Urvaruka (Cucumis melo* L. (RV. VII.59.12), *Khira* (cucumber), *Kakadi*, etc.; (ii) *Darbha (Imperata cylindrical* (RV. I.191.3) occurs with some other grasses, such as *Sara, Kusara, Sairya, Munja* and *Virana*; (iii) *Pakadurva (Cynodon dactylon* (RV. X.16.13; RV. X. 142. 8, RV. X.134.5); (iv) *Munja (Saccharum bengalense* Retz.; *S. munja* Roxb.) (RV. I.191.3; RV.I.161.8); (v) *Sipala (Blyxa octandra* Planch.; *B. roxburghii* Rich.) (RV. X.68.5), it is lily grown in ponds. It may be noted that all these plants, grasses and flower plants are found in the tropical regions of South Asian countries, from eastern Afghanistan to Bangladesh and Sri Lanka and not in any country of temperate climate.

Last but not the least is the Soma plant (Species of *Sarcostemma/Ephedra* L.?). It may be noted that to this plant one whole Mandala (IX) has been devoted in the RV. Elsewhere also it occurs repeatedly as 'the producer of a juice through mortar and pestle which is extremely liked by men and gods alike'. Innumerable theories have been proposed by scholars. However, Lal has noted the following facts which give some clue for its location - in the north-eastern part of Afghanistan. First, RV. X. 34. 1 and also the *Mahabharat* (10.17.26; 14.8.1) mention its locale in Maujavat and Mujavant, respectively. They are apparently the same. "In the *Atharvaveda* (V. 22.5,7, etc.) Mujavant is mentioned as the name of a people, along with Gandharis and Balhikas from which it would appear that the Mujavant people derived their identity from the mountain of that name. This would place Mujavant some where in eastern Afghanistan."

"It is interesting to note that the Soma, in its modified from *Haomafsa* changing to *ha in Old Persian*) is referred to in the *Avesta*, the sacred book of the Parsis. Whatever be the dates of the *Avesta* and the *Rigveda*, it has been

acknowledged on all hands that the former is later than the latter. It is, thus, evident that when the ancient Parsis parted their way from the Vedic Aryans they took the *Soma* tradition with them."

Lal has cited an incident. "Once when we visited Afghanistan, some 30 years ago, to participate in a conference 'some local scholars informed me that in the north-eastern part of that country there lives a tribe called Kafir (non-Muslims). The people of this tribe, the scholars told me, extract juice of a plant which is even now called the *haoma*. They do so on ritualistic occasions and find the juice exhilarating". Thus, even ethnological sources place the local of the Soma in the hilly tracts of eastern Afghanistan.

This brings us to the fauna mentioned in the Rigveda and their locale since this evidence also fully supports the evidence of flora noted above. Here also I can not do better than summarise B. B. Lal's text.

Fauna

(1) ***Ustra (Camelus dromedaries*, the South Asian variety of single hump; *Camelus bactrianus* of Bactrian variety with two humps).**
RV.I.38.2;VIII.5.37, etc. In popular Hindi it is called *unta*. The first variety is generally found in the sandy regions of Rajasthan, Haryana, Gujarat, etc. In India the second variety has not been reported. The Harappan art also does not portray the double humped variety. It is, however, found depicted on a stone pillar capital of the Sunga period found at Kashambi. The skeletal remains of camel have been found at Harappa, Mohenjodaro, Kalibangan and Surkotada, etc. from the Mature Harappan levels. There are terracotta and faience figurines also of this animal at Harappa and Mohenjodaro.

(2) ***Gaura (Bos gaurus* H. Smith).**
RV.I.16.5; RV. IV.21.8; 58.2; RV. V.78. 2, etc. It has a wild variety also but in RV only the domesticated variety is meant. It is a kind of bull found in the foothills of the Himalayas as well as in Thailand, etc. where rains are heavy and forests are dense.

(3) ***Mahisa* (Water buffalo, *Bubalus bubalis* L. / *Bubalus arnee*).**
RV. V.29.7; VIII.12.8; IX. 87.7, 92. 6; X.123.4. In popular Hindi it is called *bhainsa* which is found in all the countries of South and Southeast Asia. The skeletal remains of this (wild) species are found in the aceramic levels of Mehrgarh in Baluchistan (6th-7th centuries BC). At Mohenjodaro it is depicted in bronze and at Harappa on a sealing (Mature Period).

(4) ***Simha* (Lion, *Panthera Leo* L.).**
RV.I.64.8; RV. IV. 16.14; RV. V. 83. 3; RV. X.28.10, etc. In popular Hindi it is called *Sher babbar* which is found in the jungles of tropical countries of South Asia, Africa, etc.

(5) ***Hastin/Varana (Elephas maximus* L. and *Loxodonta africana*).**
RV.I.647; VIII.33.8. In popular Hindi it is called *hathi*. It is found in India, and the countries of Southeast Asia and Africa.

What is true of trees and animals is also true of the birds; they too are typically tropical in habitat. The birds mentioned in the Rigveda are as follows:

(1) ***Chakravaka* (*Anas casarca*).**
RV. II. 39.3. In popular Hindi it is called *Chakva*. It is found in the plains of South Asian countries.

(2) ***Mayura (Pavo cristatus* L.).**
RV. III.45.1; RV. VIII.1.25; RV. I.191.14. In popular Hindi it is called *mora*, in English it is peafowl. It is found in the countries of South and Southeast Asia. It is also found in the Congo basin of Africa. It is found depicted in pottery at the Early Harappan site of Kunal and Mature Harappan sites of Harappa, Mohenjodaro, etc.

Lal has, therefore, convincingly proved that the Western scholars and their Indian disciples did not do their

homework well, otherwise they would have reached to the same conclusion that "the distribution pattern of the Rigvedic flora and fauna shows beyond any shadow of doubt that their natural habitat is the tropical zone and not the cold one. Indeed, there is no mention whatsoever of any typically cold-climate tree/plant or animal/bird in the Rigveda. Nor is in any way even their memory reflected. Thus, both the positive and negative kinds of evidences show that the Rigvedic Aryans had nothing to do with a cold-climate zone. These data completely knock the bottom out of the 'cold climate thesis for the original home' of the Aryans". In all probability, all of them were the victims of the bias which Max Mueller nurtured in his mind against the fact that the Vedic Aryans were the original inhabitants of India. After all, here was involved the legitimacy of British rule in India — if the British were the 'foreigners' in India so were the 'Vedic Aryans' in India. It also suits the Marxist historians in India for whom the roots of 'Indian Nationalism' lie in the British rule in India and not in the Vedic, Epic and Puranic, Bauddha and Jain traditions which, for them, are based on myths and not history, as was held in the 19th century by Karl Marx and a few other, particularly British Imperialist writers like Sir John Strachey who wrote, "This is the first and essential thing to learn about India, that there is not, and never was an India, or even any country of India, possessing, according to European ideas, any sort of unity, physical, political, social, religious; no Indian nation, no 'people of India' of which we hear so much".

Having reached to the conclusion that "both the positive and negative kinds of evidences show that the Rigvedic Aryans had nothing to do with a cold-climate zone" Lal took up the prevailing theories regarding the Homeland of Indo-European Languages and Culture' in Chapter V. Here he grouped all the theories relating to four regions and showed how none of them is sound. First of these he calls 'The Anatolian Homeland' theories, propounded mainly by Colin Renfrew for which in 1988 Lamberg-Karlovsky observed "(the whole issue of Indo-European homeland has been) simplified by Professor Renfrew to the ludicrous formula 7000 B. C. E. Anatolia=farming=Indo-European. " In fact Indo-European has never been a dominant language in Anatolia. The second he calls, "The Caucasus Region. " This is propounded by Gamkrelidze and Ivanov who have wrongly felt that since there are some Semitic loan words in Indo-European, the Indo-Europeans must have lived near Semitic speaking people who had inhabited the land between the Balck Sea and the Caspian Sea. But it is common knowledge that this region is and has been predominantly Semitic languages area hence "the Indo-Europeans could not have been the original inhabitants of the area" observes Lal. The third proposed region is called "The 'Kurgan' Homeland". This area is north of the Caucasus where large number of burial mounds of the horse-riding warriors, datable to 4th - 5th millinia B.C., called 'kurgans' in Slavic language, are located. Maria Gimbutas is its main proponent. First, while the Indo-Europeans were agriculturists the Kurgan people were pastrolists due to which the terms used by them had entirely different connotations. The fourth region proposed by some scholars is "The Sogdiana Homeland" also called 'Central Asian Homeland Theory'. First Ghirshman, and now Johanna Nichofas uphold this hypothesis. Johanna's stand, however, is that 'there was only a language-spread and not a migration of people'. This is hardly tenable, to say the least. Lal, therefore, feels that North-West South Asia is the only region which could be held as the most probable area in this regard. For this he has quoted extensively from Vedic Sanskrit literature and Harappan archaeology. In this context he has severly criticized Romila Thapar and R. S. Sharma who have, of late, discarded the Aryan Invasion theory like all others in the world but replaced it with the term 'migration' because even this theory can not stand the test of archaeological discoveries made in Central Asia and India.

In chapter VI Lal has thoroughly exposed the scholarship of Michael Witzel who wrongly but purposely translated a part of Baudhayan SS. Although it should have been translated that while following the wishes of their mother' Ayu, along with his people, went eastward, Amavasu, along with his people, went westward', Witzel translated the latter part as 'Amavasu stayed in the west'

with the sole purpose of proving that the Vedic Aryans came to India from the west. Such is the dishonesty of this so-called eminent Sanskritist. Since it suits the Marxist propagandist R.S. Sharma, he took it as gospel truth without bothering to check whether the translation of Witzel is at all correct. But why should he after all on this point the Indian Marxist historians are one with the Western racists.

On the subject of horse, Lal observed that although it is not depicted on seals and sealings of the Indus-Saraswati sites, its skeletal remains have been found at Kalibangan, Lothal, Surkotada, Harappa, Mohenjodaro, etc. which is much more convincing a proof than any other kind of evidence. And that is rightly so; the Harappans did possess and domesticated horses as the Vedic Aryans.

Finally, Lal has through a map shown that the geographical knowledge of the people contained in the Rigveda and the geographical distribution of the Harappan sites overlap so glaringly that there is hardly any escape from the conclusion that the Vedic Aryans and the Harappans were one and the same.

The book printed beautifully on very fine art paper along with four-colour plates and must be read by everyone interested in the history of India.

S.P. Gupta

Bhagwan Singh, 2004, *Bharatiya Sabhyata ki Nirmiti* (Hindi), Itihasa Bodha Prakashan, Allahabad, Pp 247. Price Rs.75/-

This book has recently been awarded Shankar Puraskar which is considered to be a great honour for writings in Hindi. Undoubtedly the book throws new light on many aspects of Indian history, culture and archaeology. The period covered in this book is from the Prehistoric period to the present.

The book contains 49 essays of the author on subjects like concept of nation, social structure, concept of gods and demons, urban institutions, hunting and gathering, domestication of animals and agriculture, rituals, *saniskaras*, language, arts and crafts, weights and measures, aesthetics, philosophy, accounting, zero, wheel, navigation, metallurgy, and several other important topics.

The author is an eminent scholar of not only literature but also of linguistics, history and archaeology. One of his great works written in English is entitled *The Vedic Harappans* published in 1995 from Aditya Prakashan, New Delhi. So far he has authored 13 books on a variety of subjects, including five novels, two story-books, and one on linguistics entitled *Arya and Dravida Bhashaon ki Moolbhoot Ekata*.

Like his all other works, this work is also a great testimony to Bhagwan Singh's original thinking and also new interpretation of various kinds dealing with a large number of issues in Indian history. He is absolutely original. He is presently one of those rare Marxist thinkers who is looking at Indian history in the Indian Framework against those who are looking at it in the imperialist and Marxist or racist frameworks.

Those reading this book will be greatly benefited from it, particularly those interested in knowing different aspects of Ancient Indian history, culture and archaeology.

S.P. Gupta

Birendra Pratap Singh, 2004, *Early Farming Communities of the Kaimur*, Vols I, II, Publication Scheme, Jaipur. Vol. I, Pp. xxxl + 404, Pls. XL. Price Rs. 3775/-. Vol. II, Pp. xvl + 221, Pls. 63. Price Rs. 2725/-.

The work embodies the results of excavation work carried out at Senuwar located in the Kaimur district of Bihar by the author on behalf of the department of Ancient Indian History, Culture and Archaeology, BHU. The book opens with discursive introductory observations of the eminent archaeologist, Shri R.S. Bisht according to whom

"Middle Ganga plain was not only the nuclear region of political and cultural consolidation leading to urbanization in north India, the region was indeed a pioneer in the paddy cultivation, from where it perhaps diffused to other parts of the sub-continent in the third-second millennia B.C". After the discovery of Chirand it was essential for the archaeologist to further pursue the field-work so as to ascertain the neolithic and chalcolithic patterns in Bihar. The present work is an attempt in this direction.

This comprehensive excavation report includes the data and its analysis in respect of the excavation at Senuwar located on a minor stream of Ganga in Kaimur district. The field-work was conducted in 1986-87 and 1989-90. Though the excavations were conducted on a small scale, the environmental studies of the neighbourhood supplements was undertaken in detail to obtain a holistic picture about the archaeology of the vicinity. Volume I deals with the environment of the site, chronology, pottery, stone, terracotta, shell and metal objects in the conventional method. Volume II contains the chapters on scientific studies viz. Site catchments analysis (R.S. Pappu), Plant economy of early farming communities (K.S. Saraswat), Faunal remains (Vijay Sathe and G.L. Badam), Chemical analyses of soil samples (Anupama Kshirsagar) and Analyses of metal objects (R.N. Singh).

Senuwar demonstrates a striking affinity with the Neolithic cultures in the Belan valley as well as further eastward. Some new traits viz. domestication of pig, bone tool industry, use of stone beads, post-firing ochre paintings on the rim and neck of certain pots, introduction of burnished grey pottery in place of burnished black ware and the reduction of cord impressed and rusticated pots were also observed. These obviously represent the process of adaptation of new environment.

The evidence gathered from Senuwar throws light on subsequent evolution of the Neolithic cultures of Bihar. Whereas the protohistoric sites in southern Bihar are either represented by Chalcolithic cultures preceded by Neolithic horizon or by the Chalcolithic cultures being the earliest. But Senuwar was continuously occupied during Neolithic, Neolithic-chalcolithic, NBPW (early phase) and Kushan periods.

The carefully produced book is a very useful contribution for the scholars engaged in the protohistoric research in Northern India but for its high price only selected libraries may be able to afford it.

P.K. Trivedi

Rewant Vikram Singh, 2003, *Settlements in the Yamuna-Hindon Doab: An Archaeological Perspective*, B.R.Publication, New Delhi, Pp. 153. Price Rs. 1000/-

The Primary aim of this book, is the distribution of sites and understanding the settlement pattern of various cultures from the Harappan period to the Medieval times in the Yamuna-Hindon Doab on the basis of village to village explorations and excavations conducted by the author and previous scholars.

Singh has divided the book in six chapters. In chapter 1 he has given the introduction of the book including the previous archaeological work done regarding the of sequence of cultures in the area. In chapter 2 the author has discussed the ecological setting of the Yamuna-Hindon Doab with a view to explain the settlement pattern of the region. Here he has discussed the present day ecological settings — the boundaries and area, the physical features, the geology, the drainage system, the soil type, the flora and fauna, the trade and communication, village settlement and historical outline, etc., to explain the past. Interestingly, the author has also discussed the river Yamuna referred to in the religious literature which has significantly highlighted the contribution of Yamuna through the ages.

In chapter-3 the writer has described the archaeological research work carried out till date along the Yamuna-Hindon Doab. This has greatly enhanced the quality of the work done and will be very useful for the new researchers to carry out their field work in this area. In chapter 4 the author has made a micro settlement assessment of the

Yamuna-Hindon Doab and accepted the fact that the systematic survey of the area is beyond the capacity and resources of a single explorer. However, on the basis of explorations (in 3 administrative zones, viz., East Delhi, Gaziabad and Baghpat Districts), distribution and settlement pattern different cultural periods have been worked out. The author has discovered pottery shapes and antiquities of Late Harappan, Ochre Coloured Pottery Ware, Black-and-Red Ware, Black Slipped Ware, Northern Black Polished Ware, Red Slipped Ware and Kushana bricks, Gupta and Post-Gupta terracotta figurines, stone statues of the Rajput period, Glazed Ware and *lakhori* bricks. Singh has also discussed and assessed some important sites like Kaseri, Mandoli, Khurd Banhera, Siti, Loni, Hateva, Garhi-Kalanjari, Mukari, Valmiki Ashram, Pashuram Ka Khera, Baghpat, Katha, Mandaula, Baragam, Khatta Pahladpur and 15 other important sites.

In part-I of chapter 5 the author has carried out a macro settlement assessment of the area on the basis of explorations and excavations carried out by the scholars like Y.D.Sharma, K.N.Dikshit and R.S.Bisht. Here assessment has been made of the excavated sites like Alamgirpur, Allahpur, Ambkheri, Bargaon, Behat, Hulas and Mandi. In part-II of the same chapter the author has discussed the distribution and settlement pattern of Late Harappan, Ochre Coloured Pottery Ware, Painted Grey Ware, Northern Black Polished Ware, Early Historical, Late Historical and Medieval periods in the Yamuna-Hindon Doab. This study is extremely useful for the students and serious scholars.

In the last chapter the author has given a concluding remark on his work which includes area of research work, the ecological setting, the riverine setting, the settlements, cultural association and size, the distribution and the settlement pattern of sites, etc. The writer has finally assessed that the sites in the area of his research work are villages based on agriculture and some probably served the neigbouring urban settlements.

The book has one appendix which includes list of explored and excavated sites in Western Uttar Pradesh and this has greatly enhanced the importance of the book. The book is illustrated with 14 coloured plates, several figures, maps, tables and Index. Needless to point out that the book will serve as a useful publication and must find a place in all libraries of the country.

Arun Kesarwani

D.P. Tewari, 2004, *Excavations at Saunphari and Explorations in Ganga Plain*, Tarun Prakashan, Lucknow, Pp. xvi+262, 90 plates and 41 maps and line-drawings. Price Rs. 800/-

The publication, is first the of its kind in book form and covers a very vast area of central Uttar Pradesh covering the Districts of Unnao, Hardoi, Kannauj, Farrukhabad, Shahjahanpur, Pilibhit, Keri-Lakhimpur and Sitapur, all located in the Ganga plain. It has two major parts – the first, running in 210 pages, is a report on the excavations conducted at the site of Saunphari in Distt. Shahjahanpur, Tehsil Pawayan, located in the Gomati valley. The three meter deposit of the mound has yielded the remains of several cultures - starting from the Painted Grey Ware through the NBP Ware, Kushan and Medieval complexes. Besides the usual Introduction, the report presents details of cuttings, stratigraphy, structural remains, pottery and antiquities, mostly of terracotta, but some of bone stone, copper and iron. There is one separate chapter on (i) the Faunal Remains by G.L. Badam, and (ii) the Botanical Remains by Chanchala Srivastava, both are extremely useful for archaeologists. Chapter 8 is devoted to the results of the village-to-village explorations conducted by the Research Scholars of D.P. Tewari in different districts. The last chapter is devoted to general observations and summary.

There are several highlights of this publication. The first is a very scholarly treatment of the landscape archaeology, taking into account the behaviour of the rivers and the nature of their terraces, the soils and the mechanism of their formation. It has also taken into account the

environmental factors of both the past and the present, including climate, rainfall and vegetation. The treatment of the subject includes some aspects of Settlement Archaeology, for example the clustering of sites along the major rivers and also along their tributaries, some seasonal and some perennial. It has been noted that there were larger clusters along the small rivers. Distances between the settlements and their clusters have been noted and plotted. Site size and population size have also not been overlooked. Numerical differences in sites belonging to various periods of Early History of the mid-Ganga plains give an in sight into the directional changes in culture and demography.

The book is printed completely on glossy art paper but of rather poor quality, sometimes leading to indifferent reproduction of plates, bearing otherwise excellent photographs of antiquities; may be the text could be printed on map-litho and photographs on high quality and heavy art paper – the cost would not have increased. This publication is very much recommended for all young researchers in field of archaeology.

S.P. Gupta

Vimala Begley et al. (eds), 2004. *The Ancient Port of Arikamedu- New Excavations and Research*. Volume II, 1989-1992. Ecole Francaise D'extreme-Orient; Paris, Pp. xxxix + 644. Price - not mentioned.

The Volume II on Arikamedu excavation and related research is a continuation of the studies published in Volume I (Begley *et al.* 1996). The excavation was conducted by the University of Pennsylvania Museum and Madras University from 1989-1992. The publication of this current volume got delayed due to Vimala Begley's sudden demise in March 2000.

This volume includes seven major chapters besides four appendices. While volume I dealt with Northern sector of the site, volume II discusses mainly about the excavated remains in the southern sector.

Chapter one being the introduction, deals with "The Chronological Sequence" with the help of material from 1990-92 excavations in the southern sector, whereas the second chapter deals with "Trenches excavated in the southern sector in 1992" and also excavation methodology. The third chapter deals with "Pottery from the 1992 excavations in the southern sector". Here the general characteristics of the total pottery recovered from the southern sector are discussed, with emphasis on how the pottery compares with that of the northern. Chapter four written by Elizabeth Lyding, is which devoted to "The Mediterranean shipping amphoras from 1990-92 excavations". Chapter five deals with "Non- scriptural graffiti on potsherds from the 1989-92 excavations". Here the author of this chapter K.V. Raman and M. Seran, tried to integrate the evidence from former excavations, as published by Wheeler and Cassal. They also cited parallel finds at other sites in south India. Chapter six explores "The Chinese Ceramics from the 1992- excavations", which were imported, to the site Arikamedu during the period from the 10th to the 11th centuries. The last chapter (seventh) named "The list of beads and selected small finds from the 1989-92 excavation", was written by (late) Peter Francis, Jr. Here, the author for the first time attempted a detailed study of the beads. It is also the first time that the beads have been compared and contrasted with those from other archaeological sites ranging from the Black Sea to Bali. Apart from these, the author also discuss about other objects like spindle whorls and clay arecanut objects, imported glass, earplugs and reels as separate paragraphs.

Besides the above chapters, this volume contains four appendices written by eminent scholars in their respective fields of specialization. Among them mention must be made of "The faunal assemblage" which were collected from many locations in the northern and southern sectors by Dr. P.K. Thomas and "Impressed pottery from 1990-92 excavations" by Dr. V. Selva Kumar.

All the chapters and appendixes are well supported by illustrations in the form of tabular columns, photographs (black & white) and line drawings. Thus this volume is really useful for those interested in trade related studies

particularly in early historical period.

T. Arun Raj

Alok Tripathi (Ed.), 2005, *Remote Sensing and Archaeology*, Sundeep Prakashan, New Delhi, Pp. xxiv+307, 55 Plates. Price Rs. 1750/-

This book is a collection of 31 papers written by reputed authors of the country engaged in the practical application of remote sensing in archaeology. Through these articles an attempt has been made to present basic and necessary technological information in a simple scientific language dealing with modern developments of space technology. Before it began to be used in archaeology, it was successfully used in defence, agriculture, land use and urban planning, forestry and ecology, geology, soil studies, hydrology and oceanography, communication and broadcasting.

The book contains papers which show how remote sensing can be useful to archaeology for tracing the buried sites and old channels of lost rivers, etc. Formerly, and even today, aerial photography is used to provide a larger area for the study of archaeological remains. The data generated through remote sensing has revolutionised the process of assessments and managements for archaeologists. The technique of remote sensing has been utilized to study old channels of the rivers like the Saraswati, the Sabarmati, the Banas, etc., and for tracing and understanding the old cities like Kausambi, Dwaraka, Hampi, etc. For this purpose the familiarity of the subject is necessary.

Remote sensing is also a kind of photography but from satellite located in space. In simple photography a common camera with a sensitive film is used to capture the image of the object on the ground from a distance of 1 ft. to several feet away from a position almost parallel to the ground. In aerial photography special camera is used to take images from the aircraft far away and above the earth. Remote sensing, however, started with aerial photography used during the First World War to know the army positions. The first Indian remote sensing satellite was launched in March 1988 from Soviet Union and with this started capturing images in India by remote sensing technique. The higher the camera/sensor the larger the area it covers. Thus, the satellite located at a very high distance from the surface of the earth covers an area larger than that covered in ground photography or aerial photography. The basic differences in all these techniques are the area covered, the technology used and information collected. It is also, therefore, a technique to collect, use and analyse data obtained from space photography by various methods like optical, electrical, magnetic, acoustic and thermal.

Several scholars like D.R. Tiwari, M.L. Jhanwar, Alok Tripathi, P.D. Balaji, P.K. Garg, Nirupama, J. Manuel, P.V.Sathe, A.S. Gaur, P.S. Thakker, Uday Raj, P.K. Verma, R.K. Mishra, P.K. Gupta, S.M. Ramaswamy, Yash Pal, N.K. Vyas, D.K. Gosh, and others have applied this technique in the field and have contributed their scholarly papers which has made the book immensely useful for the new generation of scholars who want to use this technique in their archaeological research work on the ground or underwater.

With the help of satellite remote sensing technique, a 'lost' city of Dwarka of Lord Krishna is alleged to have been identified and located by S.R. Rao. Two articles in this connection are noteworthy — one by Alok Tripathi "Identification of Dwarka through Remote Sensing" and the other by P.S.Thakker "Probable site of Ancient Dwarka through remote sensing". Tripathi maintains that the present Dwarka is not the Dwarka of Krishna and which possibly was located near Girnar. Almost similar observation has been made by P.S.Thakker who says that Krishna's Dwarka was located in Junagarh district near Prabhas *kshetra*. 'Tradition and Archaeology' is not an easy subject, but what is important to note is that the remains of an old city of great importance has been identified and located by this method, hence the technology is of great importance.

The book is illustrated with 55 coloured plates and an exhaustive 31 pages index. This will serve as a useful

handbook of information and will certainly guide the new batch of archaeologists of the country. Every researcher in archaeology in India must have this book in his shelf.

Arun Kesarwani

P.P. Joglekar, V.D. Misra, J.N. Pal and M.C. Gupta, 2003, *Mesolithic Mahadaha: The Faunal Remains*, Department of Ancient History, Culture and Archaeology, University of Allahabad, Allahabad, Pp. 199. Price not mentioned.

Systematic studies on faunal remains from archaeological sites are extremely rare in our country. If at all, they are generally confined to a few pages at the end of archaeological reports. It is only very recent, that the faunal studies have started assuming the importance rightly due to them in archaeological investigations. This is in spite of the large volume of very crucial information the studies can provide in archaeological studies. It is therefore heartening to see a volume primarily dealing with the study of faunal remains from the Mesolithic site at Mahadaha in the Central Ganga Valley. The Mesolithic Culture, undoubtedly is one of the most widely spread cultural phase in the Stone Age prehistory of our country. Sites of this period are reported from almost every part of the country irrespective of its vast environmental disparity (Misra 1989). It is from this period onwards that we actually come across considerable quantity of faunal remains in addition to the ubiquitous stone implements. The earliest systematic burials in our country are also reported from this period. Equally important are the well-preserved rock paintings and engravings of this period in understanding the cultural activities of the people. In short, all these new sets of data have proved the reconstruction of Mesolithic hunting and gathering way of life much more informative and vivid than the earlier periods. Since it immediately precedes domestication and the food producing Neolithic way of life, faunal remains from this period are of special significance in understanding the processes of domestication and associated cultural developments. The Mesolithic settlements located in diverse environmental settings of the subcontinent, quite often exhibit divergent cultural relics due to divergent cultural adaptations. It is not surprising, therefore, that this disparity is reflected in the development of subsequent Neolithic food producing economies too. This apart, we have very little information for reconstructing the actual process of domestication and food production from different regions of the subcontinent. This is primarily due to the patchy and fragmented nature of our understanding of the Early Holocene faunal exploitation data from different parts of the subcontinent. In fact, of several Neolithic cultural regions, Mehrgarh in the middle Indus plain is the only site that has shown concrete evidence of local domestication of both cattle and to some extant sheep/goat. (Meadow 1984, 1989).

Apart from Mehrgarh, the Central Ganga valley along with the Vindhyan area, in fact, is one of the regions where we come across a number of sites showing a cultural transition from the Mesolithic hunting-gathering to the Neolithic food producing way of life (Sharma et al. 1980, 1973). Credit for bringing these sites into the focus of archaeological investigation goes to the Allahabad University team, who not only reported several Upper Palaeolithic, Mesolithic and Neolithic settlements in the region in the 1970s and early 1980's but also excavated quite a few of them. Mahadaha, Damdama and Sarai Nahar Rai figure prominently among the excavated Mesolithic settlements in the region. Yet another important site, Chopani Mando, shows a threefold developmental sequence starting with the Epi-Palaeolithic followed by the early Mesolithic that develops into an advanced Mesolithic. Dated by C^{14} to the 9th millennium BC at Sarai Nahar Rai and 7th millennium BC at Damdama, the Mesolithic assemblage in the region is one of the earliest in the country. The subsequent Neolithic sites, Mahagara and Koldihawa in the region are marked by a distinct, handmade pottery with cord-impressed decoration on its exterior along with the usual Neolithic cultural relics. That, this pottery is found associated with the Advanced Mesolithic/Proto-Neolithic assemblage at Chopani Mando is a clear indication of the cultural continuity in the region. Therefore, it suffices to say that the faunal remains from these sites in the region have tremendous potential in throwing much insight in the

pattern and process of animal exploitation that existed in the above two cultural periods.

In the background of these compelling issues, "Mesolithic Mehadaha: Faunal Remains" co-authored by P.P. Joglekar, V.D. Misra, J.N. Pal and M.C. Gupta is an informative and systematic study of the faunal data and their archaeological context. Though not attempting to address the question of domestication directly, it certainly provides valuable data for understanding the animal exploitation pattern that existed in the Mesolithic period at the site.

No archaeo-faunal study is complete without a proper description of the archaeological context of the remains. The first half of the book is justifiably devoted to this purpose. The excavators provide a detailed description of the location and environmental setting of the site which forms the right backdrop for understanding the cultural relics unearthed in the excavation at the site. Mahadaha is unique in several counts as far as the Mesolithic assemblages in the country are concerned. Not only are there, well-preserved human burials at the site but also the stature of the people interned in these burials are found to be different from other Mesolithic population (Kennedy et al. 2000). The relative abundance of bone implements and the local production of circular bone/antler beads are also quite peculiar to the site. As the site was partially destroyed by local construction work, the excavations were carried out only at selected area at the site. This makes a proper description, of the rationale for selecting the trenches for excavation and their stratigraphic features, a must for appreciating the analytical studies. Although this section is adequately illustrated with location maps, section drawings, photographs and drawings of artefacts, addition of a contour plan showing the layout of the trenches would have eminently enhanced the clarity of description. The simple schematic site plan reproduced in the second part of the book does not really serve the purpose.

The second half of the book primarily deals with the study of Faunal remains from the site carried out by the first Author. Two earlier studies on the faunal remains from the site by Allur (1990) and Chattopadhyaya (1996) were based on a part of the total faunal collection. The present study on the other hand deals with the entire faunal collection from the site. The author's treatment of the faunal data is pretty rigours and scientific. Not only does he give a descriptive account of the animal remains present at the site but also a meticulous quantitative data of each identifiable remains in different strata. It is easy to see that enough care has been taken to avoid unwarranted errors that may happen while indiscriminately quantifying the data without paying attention to the contexts of pits, hearths and burials. Arrangement of data sets in tables dealing with identification of different taxa in different contexts is extremely useful for researchers to refer the information. Equally important are the metrical details of the skeletal remains provided in the text in table form. These are in fact very useful information that may help a ready reference with faunal data from other contemporary Mesolithic sites such as Damdama and Sarai Nahar Rai in this region.

There is a small disagreement in the description of the strata in the "Western Area" and formulation of layer-wise tabulation of data. This discrepancy does not really affect the final result of the study. The tables 4 and 5 dealing with distribution of Mammalian and Non-mammalian remains at the three excavated areas at the site viz. the lake, Western and Eastern area shows layers 8 and 9 after layers 1 to 4 at the western area, while the text (page 6) mentions only layers 1 to 4. In fact the layers 8 and 9 are the Mesolithic layers in the 'lake area'.

The results of the faunal study by and large agree with the faunal data recovered from the other excavated Mesolithic site Damdama in the neighbourhood, which in fact was studied by the first Author (Joglekar) and P. K. Thomas (Thomas et al. 1995). The author's first hand intimate knowledge of the faunal data of the region is therefore apparent. The assemblage is primarily dominated by the remains of wild mammalian fauna. The non-mammalian remains are hardly 15% of the total collection. The absence of domesticated fauna in the Mesolithic assemblage is expected. However, more interesting fact is

the very meagre representation of wild cattle and sheep/goat bones in the assemblage. On the one hand it certainly implies the late survival of these animals in the early and middle Holocene; contrary to Badam's proposal that the wild cattle most probably may have become extinct in the country before the beginning of Holocene. These animals, it appears, did not play any significant role in the food economy of the Mesolithic hunter-gatherers in the central Ganga valley and probably the adjoining Vindhyan area. The data therefore precludes any possibility of herding of these animals during the Mesolithic period. Yet in the Neolithic stage the assemblage incorporates cattle and sheep/goat bones, which show full-fledge domestication.

In this context it is worth mentioning that the faunal data from the Mesolithic and Chalcolithic assemblages in Western India, especially from Gujarat and Rajastan also present comparable pattern as far as the presence of wild cattle is concerned. Isolated skeletal remains of wild cattle have been reported from the Mesolithic assemblage at Langhnaj (Thomas and Joglekar 1994) and Loteshwar (Meadow and Patel 2000) in north Gujarat as well as from Bagor in southern Rajasthan (Thomas 1975). Thomas has reported a few doubtful wild cattle bones even from the Harappan context at Kuntasi (Thomas et al. 1996) and Shikarpur. At the same time, the Chalcolithic/ Harappan faunal assemblages in this region are predominated by fully domesticated cattle, sheep/goat bones. Since, Gujarat and Rajasthan fall in the larger cultural domain of the Indus valley civilization right from the Early Harappan times, perhaps it may not be hard to explain the spread of fully domesticated cattle into western India from the northwest during the Harappan times.

The situation in central Ganga valley is certainly different from Western India. If these animals were not herded in the Mesolithic then from where and how were these animals domesticated in the Neolithic settlements of the Ganga valley? Are there any indications of an indigenous domestication of these animals in the region at all? These are the questions that need to be addressed not only by the zoo-archaeologists but also by the archaeologists working in the region. The faunal remains from Mahadaha provide valuable information in this regard that directly concerns with the period that immediately preceded the stage of domestication in the central Ganga valley.

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P. Ajithprasad

Michael Witzel, 'Ein Fremdling im Rigveda', In *Journal of Indo-European Studies*, Vol. 31, No.1-2, 2003, Pp.107-185.

Recently, N. Kazanas published a sixty page article titled 'Indigenous Indo-Aryans and the Rigveda' in The Journal of Indo-European Studies (JIES), vol. 30, Numbers 3&4 (2002), pages 275-334. The article argues that the Rigveda was composed in the 4th millennium BC, and therefore, their composers, the Indo-Aryans, may have arrived into the Indian subcontinent around or before 4500 BC, and not around 1500 BC as the conventional Aryan Invasion Theory (AIT) holds. The article provoked nine comments, of which eight were quite short (by Richard Meadow, Martin Huld, Edwin Bryant, D.P. Agrawal, Asko Parpola, Stefan Zimmer, J.P. Mallory, Elena Kuzmina) and were published in the same issue of the journal. The ninth comment, by M. Witzel of the Harvard University, was published in the next issue (Witzel 2003), which was much longer than Kazanas' article itself. Of the 79 pages that it covers, perhaps more than half of its material consists of totally inappropriate and irrelevant remarks. My owncritique here is meant to supplement Kazanas' response to Witzel.

Kazanas' Preservation principle and Polynesians

In his article, Kazanas had argued that Vedic literature has preserved the maximum linguistic and cultural elements of all IE cultures, which would have not been possible if the Vedic people were always on the move. Witzel counters this argument (p. 134) by pointing towards the example of Polynesian peoples who have preserved their oral lore despite being on the move for several millennia. However, there is a crucial difference between them, and the IA speakers, as he also notes himself. The Polynesians moved into hitherto uninhabited areas, whereas the IA speakers moved into areas that were already inhabited. The Polynesians could not have come under the influence of any 'indigenous' inhabitants. Hence, the two scenarios do not parallel each other at all.

Invasions, Migrations and Acculturations

Witzel alleges (page 116, fn. 19) that Kazanas has misinterpreted him in pointing out the confused nature of his 'elite dominance' model in his 1995 papers. But 'elite dominance', is obviously a subset of invasionist models. Witzel repeats the importance of 'elite dominance' in another later publication (Witzel et al. 1997: xxii), illustrating it with the example of the Norman invasion of England in 1066 AD and the 'arrival' (in reality, invasions) of Sakas, Hunas and Kushanas into N. W. India. These are clear-cut invasion scenarios, which Witzel now wants to deny, and obfuscate with the term 'acculturation'. By his methodology, any invasion can be converted into 'acculturation' and 'migration.' It is only in his recent writings (Witzel 2000a: 291), where he has practically abandoned the thoroughly invasionist 'elite dominance' scenarios, adapting an Ehret elite kit model to explain the Aryanization of Northern India instead.

Witzel appears to argue that by the time the IA speakers arrived in the Indus valley, the area was practically deserted and that they dealt mainly with a 'remnant population'. In other words, by the time the Aryans came to North West India, the local populations had been famished culturally to such an extent that they could be dominated very easily

by these few intruders. Such a scenario would have lead to a significant change in the genetic make up of the depopulated areas, something which has not been demonstrated so far.

Huns as the Aryans of Europe

To account for the absence of distinctly 'Aryan' elements in archaeological remains, Witzel argues (pp. 150-151) that the Avars (Huns) themselves have not been attested archaeologically until recent times. Therefore, he argues, it is quite possible that an Aryan migration happened even if they are not attested in archaeological record. This analogy is superficial. The differences between Avars and Aryans may be summarized as follows –

(i) There is no literary evidence to prove that Aryans migrated into India, whereas historical sources detailing the invasions of Avars are plentiful. Their invasions of Huns were carried by huge armies (accounts give numbers ranging from 300000 to 700000).

(ii) Avar settlers in Europe lost their language and culture practically everywhere except in Hungary, where the people speak a non-IE language. In contrast, the Aryan speakers are said to have Aryanized the language, culture and religion of entire populations over 3 million sq km.

(iii) The Avars withdrew rapidly and mysteriously from Europe (attributed to the death of their king) from Europe and are known to have carried their dead back with them. They had a very poor material culture. Their invasions lasted for a little more than a century. In contrast, the Aryan speakers are said to have just come in a one-way traffic into India in several generations and via a slow process of acculturation. Parpola also sees at least two such waves covering several centuries.

(iv) The homeland of Proto-Indo-Europeans (PIE), who were the ancestors of Aryans, is still unknown. In contrast, the homeland of Avars has been located with a fair certainty in eastern Siberia.

(v) While the ancestry of proto- Huns is traced to 200 BC, the PIE speakers are still a hypothesized group whose existence is yet unproven, although they are speculated to have lived in one of the thirty or more hypothesized 'homelands' before dispersal in all directions.

(vi) The Avars launched massive invasions all over Eurasia, causing a lot of bloodshed and destruction, but the IA speakers are said to have arrived largely in a peaceful manner, and achieve what Avars could not.

(vii) In any case, archaeological remains of the Avars have been unearthed by now, but such remains are absent for migrating IA speakers.

Vedic Ratha = Witzel's 'Vedic Tank'

Witzel emphasizes that the 'real' Rgvedic chariot necessarily has spoked wheels, and is a light 'Vedic tank'. Or in other words, the 'ratha' is necessarily a war machine and is always pulled by horses (p. 109). Archaeological evidence from other parts of the ancient world however shows otherwise. A seal impression from the Late Minoan period in Crete shows a 'real' spoke-wheeled chariot being pulled by a pair of goats (Zeuner 1963:144), whereas the copper models of horse-drawn chariots unearthed from Diyala (Zarins 1976:579) show solid wheels.

Witzel says (page 158) that the word for chariot in Sanskrit is derived from older IE word for 'wheel' and gives some cognates. This would rather prove my point that the Vedic ratha originally meant simply a vehicle, or a cart or just a wagon. Why would someone name their innovation, the chariot, after the word for 'wheel'?

What Witzel does not point out is the fact that there is no archaeological evidence of the existence of chariots in the period when the IA speakers are supposed to have arrived in north-west Indian subcontinent. Absolutely no remains of chariots (or any depictions) are found in the greater Punjab region from post 1900 BC right down to Mauryan times (c. 250 BCE). In any case, chariots came to many cultures such as ancient Egypt and ancient China

from outside without bringing about any change of the language or culture in these civilizations. Adaptation of technical inventions need not be confused with linguistic or other changes as Witzel seems to believe.

Archaeometallurgy and Vedic Texts

One of the arguments made by Kazanas to suggest that Vedic texts could date to 3000 BC or earlier is that the astronomical data in these texts indicatew stellar positions from that period. In ancient times, it was almost impossible to back-calculate the positions of various constellations etc. over a period of 1000 years, and therefore, the astronomical data in these texts represents actual astronomical observations by the composers of the Vedic texts. Witzel counters this by arguing that Satapatha Brahmana belongs to a 'full-blown Iron age' (p. 174), interpreting the frequently mentioned *syama ayasa* as iron whereas Kazanov thinks it to be bronze. The equation *syama ayasa* = iron has become accepted due to certain earlier popular books like *The Vedic Index* (Keith & Macdonnell 1912, Volume II, p. 398). But this is a disputed claim, e.g., in a study on gold in Vedic texts, Jan Gonda [1991] suggests that the word could mean bronze and K.D. Sethna (1992: 235-236) opines the same. Regarding the occurrence of iron in Indian subcontinent prior to 1200 BC, Witzel forgets to note that iron can be produced as a by-product during the smelting of copper.

Witzel then counters Kazanas' high chronology for the events of Mahabharata by arguing (page 174-175; 176-177, fn. 115) that the text itself is very late because it even mentions the Yavanas, Parthians, Shakas and the cities of Rome and Antioch (which was occupied by Romans in the 1st century BC). The argument is spurious because Kazanas never denies that the Mahabharata is a stratified text, and the verses mentioning these peoples and these cities may well be late interpolations. They do not really form an integral part of the central story in any case.

The Disappearing Sarasvati

a) Indus-Sarasvati, or Indus Valley Civilization (IVC): In recent decades, archaeologists in India and Pakistan have discovered more than a 1000 sites along the dried up Ghaggar-Hakra plains. Literary data from the Vedas indicates that the Ghaggar-Hakra river system is indifferent from the Sarasvati river extolled so highly in the texts. Since the earliest sites of IVC were discovered along the Indus river and its tributaries, the civilization was named thus, following conventions of archaeology. However, the current situation is that fewer than 25% of the sites lie along the Indus river and its tributaries, more than 50% along the Ghaggar-Hakra system, and the rest are scattered in Gujarat, Ganga-Yamuna doab and other regions. Witzel laments (page 165) – "There is a move by some Indian archaeologists and indigenists to call the Harappan civilization, against common archaeological convention, the 'Indus-Sarasvati' Civilization". However Jane McIntosh, among others, recognizes the importance of Sarasvati sites in the entire IVC area (Mcintosh 2002: 24) "...Suddenly it became apparent that the 'Indus Civilization' was a misnomer – although the Indus had played a major role in the development of the civilization, the lost Saraswati River, judging by the density of settlement along its banks, had contributed an equal or greater part to its prosperity. Many people today refer to this early state as the 'Indus-Sarswati Civilization' and continuing references to the 'Indus Civilization" should be seen as an abbreviation in which the 'Saraswati' is implied." In short, there are purely academic reasons to suggest a change in nomenclature, and one should not see political ideologies or religious motivations in this 'move'.

b) The older name of Sarasvati: Witzel refers (page 164) to an older article of his (Witzel 1999a, § 4.3,5) wherem he argues that the older name of Sarasvati was Vaisambhalyaa, mentioned in Taittiriya Brahmana (and Bharadvaja Siksa, etc.). Witzel classifies this word as of Austro-Asiatic origin, and then suggests that this indicates that the Kurusketra region was initially inhabited by speakers of para-Munda languages. These people were apparently displaced by IA speakers, who then Aryanized the name of the

river to 'Sarasvati'. The word actually has a very transparent IA etymology as explained even in the *Jnanayajnabhashya* of Bhatta Bhaskara. Sarasvati was so called because 'it nourished and sustained masses of people'.

c) Location of Vinasana: Witzel (pp. 164-165) states – "The river [Sarasvati] has been mentioned frequently in the RV and subsequent texts and survives as a small river, the Sarsuti-Ghaggar-Hakra in Haryana, that quickly disappears in the desert, as the Brahmana texts already tell us." Rather, the Tandya Brahmana 25.10.16 says that the spot of disappearance of Sarasvati is more than a month's journey (44 *asvins*, calculated to be 880 miles) from its origin on horseback! It must be emphasized here that nowhere does the Rigveda say or even hint that the Sarasvati river ends up in a desert at a place named Vinasana or Adarsana. Such a notion starts appearing only in Brahmana texts, and is absent in all the extant Samhitas of Vedas.

The Hunt for Aryan Genes

Witzel (pp. 152-153) is very hopeful that genetic studies will eventually unveil the genetic tracks of Aryan immigrants to India. He cites several recent articles, notes that they do suffer from some deficiencies, but concludes nevertheless that – "Recent works by Bamshad, Majumder, Underhill, Sells, and many others have uncovered preliminary evidence that not only points to pre-historical movements into India from Africa and the Middle East, but movements in later periods as well from Central and even East Asia."

The American journal *Archaeology* [September/ October 2001:13] summarizes the results of Bamshad *et al.* and says - "DNA does tell tales, according to researchers who studied the genetic data of 250 unrelated men from eight social castes of southern India. Y-chromosome analysis, which identifies the genetic material passed along the paternal line, reveals that members of the upper castes are more genetically similar to Europeans, while lower caste members share more genetic similarities with Asians. The study, by researchers from the University of Utah, Louisiana State University, and Andhra University, India, confirms literary and archaeological evidence for a Vedic invasion of the subcontinent from the northwest between 3,5000 and 3,000 years ago. This "new" population is generally considered to have occupied higher positions within India's caste system."

Let us examine how sound the conclusions and methodology used by Bamshad et al. (2001) are. We observe – The sample size is very small, and restricted to one district in coastal south India, to where migration of upper-castes from North India is attested even by Vedic texts (for instance the legend in Aitareya Brahmana mentioning that descendants of Visvamitras moved east and south to become Pundras, Sabaras, Andhras and so on). No statistical justification is given by the authors for what is prima-facie an insufficient sample size. The authors do not take into account the mobility of caste and sub-caste groups in social hierarchy. They just assume that present day Kshatriyas were Kshatriyas in 1500 BC as well. The genetic distance tables actually show that the 'genetic distance' between Indians as a group, and East Europeans is less than that between East Europeans and South Europeans. This puts a question mark on the very basis of the 'genetic' category 'European' employed by Bamshad et al. The paper is silent on when these 'Eurogenes' entered the various castes of India. These genes could have well come during Shaka, Greek and Persian invasions and thus have nothing to do with the Aryans at all. The authors of the paper however assume that these genes were brought in by Aryans around 1500 BC.

Concluding Remarks

The conventional Aryan Invasion/Migration Theories advocate that –

(i) The IA speakers preserved their voluminous literature, heritage and religion despite being on the move, even when passing through vast inhabited territories, something that is contrary to norm (with a few

exceptions such as that of Polynesians).

(ii) The IA speakers managed to Aryanize the culture, religion, language of the indigenous population of an area of 3 million sq km., without leaving any literary, archaeological, genetic, anthropological evidence. This is against the norm and very few exceptions exist.

(iii) The process is said to have been achieved without much violence or use of force. The 'acculterated' or 'conquered' peoples have no memory of this having happened. This is again against the norm.

(iv) A culturally inferior people are said to have overwhelmed a more advanced civilization. This is again against the norm.

(v) Evidence from Geology and Archaeoastronomy contradicts the soft linguistic evidence.

(vi) South Asian cattle (zebu) appear around the same time in the Middle East that Aryans supposedly enter South Asia – movements in opposite directions.

Many other reasons could be cited to argue why the Aryanization of much of the Indian subcontinent around 1500 BC is a highly implausible scenario. At least, the existing body of evidence from various fields does not compel us at all to accept such a thing. This does not mean of course that the Indo-European speakers were indigenous to the Indian subcontinent and that this area is the original homeland of IE languages. Again, the existing body of evidence does not compel us to accept such a possibility being real. One rather needs to examine the data afresh, with an open mind, as Kazanas urges, and determine if the coming of IA languages into the Indian subcontinent could have happened much earlier than when Indo-Europeanists and Indologists believe this had really happened.

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REPORT OF THE XXXVIII ANNUAL CONFERENCE

Report of the XXXVIII Annual Conference of Indian Archaeological Society held at the State Department of Archaeology, Government of Uttar Pradesh, Lucknow, from 28th to the 31st of December 2004.

The Annual Conference of the three Societies, namely, the Indian Archaeological Society, the Indian Society for Prehistoric and Quaternary Studies and the Indian History and Culture Society was inaugurated by Shri. Ambika Chaudhary, Hon'ble Minister of Revenue, Government of Uttar Pradesh, on the 28th December, 2004 at Ganna Sansthan Auditorium, Dalibagh, Lucknow. Smt. Rita Sinha, Principal Secretary, Department of Culture & Tourism, Government of Uttar Pradesh received the delegates on behalf of the Government. Shri. Rakesh Tiwari, Director, State Archaeology, presented an account of the activities of the State Deptt. The Minister of Revenue released *Pragdhara*, the Journal of the State Department of Archaeology. Dr. Tiwari also released *Puratattva No. 34*, a bulletin of the Indian Archaeological Society. Prof. B.B.Lal, former Director General of the Archaeological Survey of India gave the Presidential Address of the Indian Archaeological Society. Shri. Subhash Trivedi, Special Secretary, Department of Culture, Government of Uttar Pradesh gave the vote of thanks.

The Indian Archaeological Society's honorary fellowship was conferred on Prof. G.L. Possehl, University of Pennsylvania Museum, Philadelphia, in recognition of his outstanding works in the field of archaeology, especially his monumental works on the Indus-Saraswati Civilization.

Programme

29th December 2004. Wednesday

Morning session

Seminar on the Chalcolithic Cultures in the Middle Ganga Valley.

The theme of the Seminar of the Indian Archaeological Society was introduced by S.P. Gupta and K.N.Dikshit. A number of archaeologists participated in the discussion. R.K. Varma, D.P. Tripathi, Shitla Prasad Singh, J.N. Pal, V.D. Mishra, M.C. Gupta, Manoj Kumar and J. Manuel spoke on different aspects of the growth of this culture in

the Middle Ganga Valley. Varma gave a detailed account on the Mobiliary Art of Mesolithic Culture of Ganga Valley; whereas most of the speakers, spoke on the development of neolithic and chalcolithic cultures in the valley. A review of historical cultural remains was also presented.

Afternoon Session

Agarwal, O.P.
Strategy for the Conservation of Archaeological Objects in India.

Dhania, D.S.
Indus Mystery Deciphered.

Deonarayan, Prasad
Language and script of the Indus Valley.

Singh, S.B.
Minor and Folk Deities in Uttaranchal Region: Based on a Sculptural Study.

Bhengra, D.
Brick Temples of Orissa with Special Reference to the Angesdvara Temple of Pitapara District Bhubaneswar.

Rajesh, S.V.
Architectural Remains from Vizhinjam, Kerala.

Kumar, Ajit.
New Identification to the so-called Surya and Indra panels of Bhaja Cave No. 22.

Verma, V.K.
The Origin and History of Saka Movement.

Vidyanand, Singh
Digital Documentation of our Cultural Heritage.

Jadhav, S.S.
Ajanta Cave 29 - A fresh Study.

Singh, R.K.
Maurya Yug Mein Nagar Prashasan.

Manuel, J.
Harappan Environment as one variable in the preponderence of Rhinoceros and paucity of Horse.

Banerjee, Sulekha
Archaeological Site Museums of Chalcolithic Culture.

Sharma, M.L.
Chalcolithic Remains from Sohanpur Rock Art Site: District Sikar in Western India.

Vinay Kumar
Early Use of Iron in South Asia Special Reference to the Gangetic Doab.

30th December 2004. Thursday

Morning Session

Business Meeting

Kumar, Manoj
The Neolithic Culture of Northern India: An Ethno Archaeological Study.

Margabandhu, C.
An Archaeological Cultural Study of the Late Medieval Settlement at Nimrana, Dist. Alwar, Rajasthan with Special Reference to the Ancient Step Well Situated on the Moghul Highway.

Pal, J.N., V.D. Mishra and M.C. Gupta
Chalcolithic Phase at Jhusi.

Yadav, Surender Kumar
Madhya Ganga ghati Mein Awasiya Vinyas: Varuna Nadi ke kshetra ke Vishesh Sandrabh Mein.

Afternoon Session

Singh, Arun Kumar
Some Monumental and Architectural Remains at Chairi Village.

Gupta, S.P.
A plea for Coastal Archaeology.

Tripathi, Alok
Excavation of Historic Shipwrek: Princess Royal.

Tiwari, D.P.
Excavations at Ahiruwa Rajarampur, Dist. Kannauj.

Pathak, Rashmi
Blues in Ancient Indian Murals.

31st December, 2005. Friday

Morning Session

Sridhar, T.S. & S. Vasanthi
Rock Art in Tamil Nadu - A Review.

Jain, Ramesh
Identification of Ahalya Episode in the Pre-Historic French Paintings at Lascaux and its Consequences.

Jha, S.K.
Terracotta from Ambara or Akhnoor.

Srivastava, Vibha
Bharat ki Samskritik Virasat — Bundelkhand.

Sharma, M.L.
A New Rock-art Site Discovered in the Shekhavati Region.

Vasanthi, S.
Maligaimedu Excavation.

Sinha, Ranjana
Asam Mein Vaisnav Dharma — Shilalekhon ke Adhaar Par.

Dubey, D.P.
Sita- Ramji Temple Inscriptions - An Epigraphic Note.

Yadav, S.N.
Kalinjar ki Prarambhik Madhya Kalin Pratimayen.

Singh, S.P.
Purvi Uttar Pradesh ki Tamrapashanik Sanskritiyan.

Misra, O.P.
Recent Archaeological Excavations in Narmada Valley with special reference to Sagar Sarovar and Indra Sagar project.

The valedictory function was held on 31st December, 2004. In the closing session, P. C. Pant, Vasant Shinde, and B.B.Lal the important work done in the archaeological field especially in the Middle Ganga Valley and also commented on the latest material discovered in Western India. The function ended with a vote of thanks to the State Department of Archaeology, Lucknow. The delegates thanked the organizers for the success of the conference.

K. N. Dikshit
General Secretary

The Indian Archaeological Society – A Brief

The Indian Archaeological Society took its shape in 1967, with its headquarters at Banaras Hindu University, Varanasi. On 27th July 1968, a meeting of some select archaeologists was convened in the Numismatic Society's hall at BHU under the chairmanship of Prof. A.K. Narain. The agenda of the meeting was, "How to encourage and promote the study of archaeology in the country ?" A.K. Narain emphasised the need of an academic forum for archaeologists outside the direct Governmental control, and for widening the archaeological horizon in the country. As an outcome of the collective decision taken in this meeting, an organisation was formed and named "The Indian Archaeological Society", with its office in the premises of the Numismatic Society of India, B.H.U. A.K. Narain, K.K. Sinha, J.P. Singh, P. Singh, T.N. Roy, Vidyaprakash and O.P. Tandon proposed to register the Society under the Society's Registration Act 21 (2), 1860, this was done at Lucknow as per rules. The aims and objectives of the Society were however, not confined to guidance and promotion of archaeological research. They included publication of a research bulletin as well as monographs, organising annual conferences, maintaining a library, instituting awards and medals for young scholars, organising a museum of its own and coordinating the work of the Governmental and Non-Governmental academic institutions in the field of archaeology. It was decided to bring out a bi-annual research bulletin ***Puratattva***, subtitled as "The Bulletin of The Indian Archaeological Society". It had H.D. Sankalia as Chairman, A.K. Narain as General Secretary and Rai Govinda Chandra as Treasurer. B.B. Lal and G.R. Sharma were nominated as Vice-Chairmen. Secretaries were M. Seshadri (Prehistory), B.K. Thapar (Protohistory) and S.B. Deo (Historical Archaeology). S. Nurul Hassan was one of the Vice-Presidents of the Society. The other office-bearers included luminaries as well as young scholars in the field of archaeology and history such as A.K. Narain, S.P. Gupta, S.B. Deo, R.V. Joshi, B.P. Sinha, P.C. Pant, K.D. Bajpai, K.T.M. Hegde, J.P. Joshi, M.K. Dhavalikar and D.P. Agrawal. The Society started publishing ***Puratattva*** from the block year 1967-68, under the joint editorship of A.K. Narain, S.B. Deo and M. Seshadri. The objective of the bulletin was to publish primary reports on archaeological field-work as was emphasized in the editorial of the first issue, which was dedicated to the memory of the late Prof. B. Subbarao.

A. Ghosh, the then Director General of the Archaeological Survey of India, had some differences of opinion with the Society's constitution. The problem was amicably settled largely due to the personal efforts of S.P. Gupta, who was close to both A. Ghosh and A.K. Narain, although he was very young then. Subsequently, the amendments brought about in the Society's Constitution were fully endorsed by A. Ghosh.

By 1970, the headquarter of the Society was shifted to the National Museum, New Delhi. Sankalia continued as Chairman while B.K. Thapar was elected as General Secretary at the IV[th] Annual Conference of the Society held at Nagpur, since by that time Prof. Narain had taken a job in the Wisconsin University, USA.

B.K. Thapar who continued as General Secretary of the Society, had emphasized that one of the principal aims of the Society would be to hold periodical Seminars and gatherings for academic purposes. In May 1971, the Society organised the first seminar on OCP and NBPW, the

List of the IAS office-bearers from 1967 onwards

1967 to 1970	Chairman	H.D. Sankalia
	General Secretary	A.K. Narain
	Treasurer	Rai Govinda Chandra
1970 to 1974	Chairman	H.D. Sankalia
	General Secretary	B.K. Thapar
1975 to 1978	Chairman	H.D. Sankalia
	General Secretary	B.K. Thapar
	Treasurer	B.P. Sinha
1978 to 1984	Chairman	B.B. Lal
	General Secretary	K.N. Dikshit
	Treasurer	S.P. Gupta
1984 to 1990	Chaiman	K.V. Soundara Rajan
	General Secretary	S.P. Gupta
	Treasurer	K.N. Dikshit
1990 to 1996	Chairman	S.P. Gupta
	General Secretary	K.N. Dikshit
	Treasurer	Shashi Prabha Asthana
1996 to 2004	Chairman	S.P. Gupta
	General Secretary	K.N. Dikshit
	Treasurer	K.S. Ramachandran
2004 to —	Chairman	K.M. Shrivastava
	General Secretary	S.P. Gupta
	Treasurer	K.N. Dikshit

proceedings of which were published in the *Puratattva* No.5.

The Indian Archaeological Society was gifted a sum of Rs. 10.5 lakhs in 1985 to acquire land by Prof. Devahuti (1929-1988) of Delhi University. The plot measuring 1.54 acres, at B-17, Qutab Institutional Area, New Delhi, 110016 was bought from D.D.A. Prof. Devahuti, with her husband, Prof. Damodar Prasad Singhal (1925-1986) of Brisbane University, Australia, planned the building of the Society. The Society started constructing the building in 1997 and shifted its office to the new building in 2000.

The Society also established a Centre for Research and Training in History, Archaeology and Palaeo-environment. In the new building, a museum named "Indrapastha Museum of Art and Archaeology" was established. It has a large collection of stone tools, beads, pottery, paintings etc. The Museum's collection is greatly enhanced by Late Dr. A.P. Khatri's donation of a large collection of fossils and stone tools collected from India and abroad during his three decades of explorations. In the last two years, about 1500 books including some new journals, have been added in the library of the Society, thus making a total of 6000 books.

Acitvities of the Indian Archaeological Society

I. Tracing the Trade and Cultural Links with other Countries

(i) A Report on the Visit to Thailand and Cambodia for Archaeological Explorations and Tie-ups.

The General Secretary, Dr. S.P. Gupta, visited Thailand (from 22nd to 30th June) and Cambodia (from 1st July to 7th July 2004) to explore the possibility of entering into some kind of collaborative/participatory arrangements or agreements to work on the subject of Coastal Archaeology in SE Asia.

Meetings with scholars and seeing the materials in the museums in Bangkok made him realize that there are some sites on the southern coast of peninsular Thailand in the excavations of which we can participate to be acquainted with the non-local materials coming from China and India, as well as West Asia. At present, the site under excavation is Phu Khao Thong located in the Sub-District of Suk Sam Rarn, Ranong Province. The Director, Archaeology, has agreed to allow our men to participate in the ongoing excavations.

In this context, it may be noted that in the eastern coastal site of southern Thailand, named Khao Sam Kaeo, in Chumphon province, a dark grey Rouletted potsherd with button base, dated to ca. 1st BC, was found in the excavations. The excavators feel that the pot had come from India. There are, however, other sites also worth considering for joint expedition. On the West Coast are Klong Thom in Krobi Province and Koh Kho Khao in Phang gna Province.

The Institute of Culture and Fine Arts of the Royal Academy of Cambodia, Phnom Penh, functioning under the directorship of Dr. Chhay Yiheang, was the host in Cambodia. A meeting was arranged in the morning of 1st July 2005 wherein Dr. Gupta met half-a-dozen young and bright researchers. The purpose of his visit: to undertake explorations and excavations along the coastal area of Cambodia and other countries of SE Asia was discussed along with the decision to confer Fellowship to a scholar who would like to do his Ph.D. on any subject related to trade along the east coast- from South China Sea through Cambodia to India and beyond to West Asia. This decision was welcomed by all the scholars.

In order to familiarise himself with the coastal as well as some hinterland sites, three-day visit along with Mr. Phong Kaseka and Mr. Chhim Sokhan Dara, both English-knowing bright archaeologists, was planned. Mr. Kaseka arranged his own car for the exploration. The following sites, starting with Phnom Penh on the morning of 5th July 2005, were visited.

1. Kev Phos in the Koh Kong Province where there is a modern private seaport engaged in berthing large vessels coming from and going to Thailand. One has to explore the nearby areas for locating an ancient port if it had at all existed here.
2. The famous sea-resort and international seaport of Sinhaukville and Kampong Saom. It is a natural harbour and should be thoroughly explored.
3. Kampong Chen village and Kampong Kandal and Kampot township which have several French style colonial buildings (Cambodia was a French Protectorate for 100 years). It is also a natural harbour with a large island. The local villagers are still engaged in fishing and tracking by different kinds of boats. Some glazed ware shards on the shore were also collected. It is a potential site and demands extensive survey to locate ancient ports.
4. Wat Prasat in the Kampot Province. It is a township with a living Buddhist monastery with an attached temple. From here, the party went to the Provincial town of Takev and stayed there for the night in a hotel. In this Province, the members visited two side-by-side existing brick temples dedicated to Shiva which urgently require conservation. By its side is a large modern Buddhist temple. In the mountains, some kilometres away from here, is a cave temple. Both the sites require extensive explorations.
5. From here, the party moved on to the site of Prasat Tonle Bati in the same Takev Province. Here there are the remains of some of the most intricately carved 13th century Buddhist temples built in stone.

In the afternoon of 7th July, the members came back to Phnom Penh. The afternoon was utilized to visit the bookshops in the city from where half-a-dozen excellent books on history, art and architecture of Cambodia were bought by Dr. Gupta along with another half-a-dozen books on art and archaeology of Thailand in Bangkok. All of them are in library of the Society for everyone to consult.

At Phnom Penh, there is the Royal University of Fine Arts with a faculty of Archaeology. It was headed by internationally known scholar Prof. Hor Lat until recently. After his retirement, it is being headed by Mr. Pheng Sy Tha. We met both of them and it has been decided to exchange scholars for teaching purposes at a future date. Unfortunately, like all other centres of higher learning, this university and its faculty members also suffered a lot in the hands of Pol Pot, Dictator of the Red Khmer Party of the Communist regime, as million others had suffered and lost their lives in merciless killings of the intellectuals in this country. The University is, however, limping back to normal teaching and research since complete peace is prevailing in the country. We hope to develop long-term contacts with them. Dr. Amarjiva Lochan of the Delhi University was of great help in the entire effort.

(ii) Report on the Archaeological Field Trip to Zanzibar (Tanzania) on Invitation of the African Archaeology Network.

Dr. Sunil Gupta was invited by Prof. Felix Chami, General Co-ordinator of the African Archaeology Network and Head of the Archaeological Unit at the Dept. of History, University of Dar es Salaam to join his excavations in the Jambiani region of Zanzibar. The invitation followed Prof. Chami's visit to India in March this year as part of an exploratory tour to further contacts between Indian and African archaeologists. During his visit, Prof Chami gave lectures at the Indian Archaeological Society, New Delhi and at the Allahabad Museum. Our collaboration is established under the Indian Ocean Archaeology framework. The African Network has initiated a project on the Archaeology of East African Coast and its external contacts with Indian Ocean Lands and the Mediterranian. A similar project, with an Indic perspective, has been launched by the Centre for Research in Archaeology, History and Palaeo-environment under the aegis of the Indian Archaeological Society.

The field excavations, in which he participated from 4th - 12th July 2005, were conducted within a large limestone cave in the Jambiani region of southern Zanzibar. The geomorphology of Jambiani region, and indeed much of the coastal Zanzibar is shaped by coral reefs and surfaces of Coral 'rock' covered by bush. The cave formation at

Jambiani and other similar sites were once under the sea and have been raised by tectonic movements. The archaeological deposit within the cave was mainly neolithic broadly dating between 800-300 BC. The results of the excavations (still in progress) are soon expected. It is important to point out that the caves formed a part of coastal trading networks in ancient times. In his excavation of other cave sites on the offshore islands of Zanzibar and Mafia, Prof. Chami has found evidence of trade ceramics and beads from Mediterranean, Arabia and India dating to the turn of the Christian Era. Some indicators, such as a fragment of marl clay pottery from the Nile Valley and a Mediterranian glass bead, dateable to the mid-late 1st millennium BC were found.

Dr. Sunil Gupta also visited the cave site at Machaga. Machaga lies close to a creek on the western coast of Zanzibar. Prof. Chami's excavations at Machaga brought to light Indo-Pacific type glass beads which we know were produced in southern India and South-east Asia throughout the first millennium AD. Machaga cave is in proximity of the historic period port-site of Unguja Ukuu on the western coast of Zanzibar. Dr. Abdurrahaman Juma of the Zanzibar State University, who excavated Unguja Ukuu from 1989 to 1994 conducted a tour of the site for the Dar es Salaam field school. Unguja Ukuu, spread over an area of 17 hectares, was a port that flourished from 500 AD to 1600 AD. Dr. Juma's excavations established that Unguja Ukuu was occupied by people using the Triangular Incised Ware (TIW), a diagnostic Late Iron Age pottery that proliferates along the Swahili coast. The surface of the site shows a scatter of green glassed wares of likely Persian Gulf origin. According to Dr. Juma the glassed wares are dated to the 8th to 9th century AD, indicating that Unguja Ukuu was a part of an Indian Ocean trading network linked to ports like Siraf (Iran) Suhar (Oman) and Sanjan (India). Dr. Juma has also reported a few sherds of likely Indian Origin. These sherds seem to belong to the late Red Polished Ware types dating to 5th – 6th century AD.

There is an increasing acceptance among East African archaeologists that Indian pottery of the Early Historic – Historic period was deposited on the offshore islands of Tanzania. Prof. Chami showed some exotic sherds from early levels of Kilwa, of which Dr. Gupta recognised a few sherds datable to 5th century AD and felt that they could be correlated with an Indian RPW type, endemic to western India and occurring on the Arabian Sea rim sites of Qana (Yeman), Khor Rori (Southern Oman) and Suhar (Northern Oman). Are these ceramic indicators of Indic contact suggestive of the reference in the *Dasakumaracharita* (Sanskrit text of the 6th century AD) to trade with the 'island of the black yavanas'? The well known English historian A.L. Basham interpreted this phrase as meaning early Indian maritime contact with the island of Zanzibar.

During his stay, Dr. Gupta delivered two lectures to the Dar es Salaam field school, one on South Asain Archaeology and the other on the Indian Ocean Archaeology framework. Bot his lectures were well received by the students. Thus it imperative that this dialogue continues, with institutional mechanisms that ensure regular exchange of archaeologists between South Asia and East Africa.

II. Awards

(i) List of Dr. V.S. Wakankar Awards

The Madhya Pradesh University Grants Commission vide their letter No. 2081/C-3/38/91, dated 25.12.91 sanctioned a sum of Rs. Fifteen lakhs (Rs. 15,00,000/-) to the Indian Archaeological Society, New Delhi for using this amount as "Corpus Money" for the Award in the memory of well known Field Archaeologist from Madhya Pradesh, Late Padmashree Dr. V.S. Wakankar. Out of the interest of this "Corpus", The Indian Archaeological Society has instituted the Award of Rs. 21,000/- every alternative year to honour an outstanding field Archaeologist.

The following is the order of Awards given so far to various scholars. The award is given at the time of the Annual Conference of the Society.

Sl. No.	NAME	DESIGNATION	YEAR	PLACE
1.	Prof. H.B. Lal	Former Director General,Archaeological Survey of India,New Delhi.	1992	Bhopal
2.	Prof. B.P. Sinha	Former Head of the Department,Ancient Indian History & Archaeology, Patna University, Patna.	1994	New Delhi
3.	Dr. Y.D. Sharma	Former Deputy Director General, Archaeological Survey of India,New Delhi.	1996	New Delhi
4.	Dr. K.M. Srivastava	Former Director,Archaeological Survey of India,New Delhi.	1998	Allahabad
5.	Sh. M.N. Deshpande	Former Director General,Archaeological Survey of India,New Delhi.	2000	New Delhi
6.	Prof. K.V. Raman	Head of the Department, Ancient History, Culture & Archaeology, Madras University, Chennai.	2002	Cochin
7.	Prof. V.N. Mishra	Former Director,Deccan College, Pune. (in absentia)	2004	Lucknow

(ii) A.K. Narain Award

The '*A.K. Narain Award for the study of Cultures and Civilizations other than India*' was instituted by an endowment of Rs. 50,000/- made by Mrs. Usha Narain. The award is aimed for the best (as judged by the award committee) published work or unpublished Doctoral Thesis (by any scholar not older than 40 years) on any subject pertaining to Archaeology, Prehistory and Quarternary Studies and History and Culture of Countries other than India. However, as per clause eleven of the agreement, in absence of any outstanding work on 'countries other than India', any such work dealing with relations of India and other countries in context to the three above mentioned subjects, will be awarded the 'A.K. Narain award' if found eligible by the Award Committee. Till date there have been two recipients of this Award

1. Dr. M.A. Nayeem, for his book "*Rock Art of Arabia*", received this award in the year 2000.
2. Dr. Bachchan Kumar, for his edited Volume of Mr. H.B. Sarkar's Book "*Glimpses of Early Indo-Indonesian Culture*", received the Award in the Year 2002.

Publishers, Scholars are herewith requested to send us publications they deem fit for consideration by Award Committee for this prestigious award. The award will rotate annually between the three subjects mentioned above; meaning thereby that 'archaeology' as the subject for the Award will be considered once in three years.

III. Lectures

(i) Y.D.Sharma Memorial Lecture

S. No.	Year of Lecture	Name of Speaker	Venue
1.	2003	Prof.B.B.Lal	National Museum Institute, New Delhi.
2.	2004	Sh. J.P.Joshi	National Museum Institute, New Delhi.

IV. Films

The Indrapastha Museum of Art & Archaeology has in the year 2005 successfully produced five documentary films for Prasar Bharti (Broadcasting Corporation of India) titled as under:

1. Development of Metal Technology.
2. Story of Book Writing.
3. Cloth and Clothes in History.
4. We and Our Monuments.
5. Time.

Doordarshan will telecast these documentaries under the common heading — 'The Way We Were' within this financial year.

General Secretary

THE INDIAN ARCHAEOLOGICAL SOCIETY

BALANCE SHEET AS ON 31.03.2005

LIABILITIES		AMOUNT (RS.)	ASSETS	AMOUNT (RS.)
Capital Fund	4014874.99		**Fixed Assets**	
Add : L.M.Fees	37000.00		(As per Annexure 'A' Attached)	13,901,419.00
	4051874.99		(As per Annexure 'B' Attached)	462,864.00
Less:- Excess of Expend over Income	2153566.09	1,898,308.90		
Corpus Fund		1,688,000.00		
			Current Assets and Investments	
Building Fund		8,858,263.00	Fixed Deposit	1,681,264.00
			Govt. of India 8% Bonds	1,000,000.00
Lecture Fund- Dr.Y.D.Sharma		200,000.00	D.G.A.S.I.- Security Deposity-Kamrej	10,000.00
Dr. A.K.Narain Award Fund		50,000.00	BSES Rajdhani Powe Ltd (Deposits)	86,886.00
Donation For Cupboards		16,080.00	ICHR	60,000.00
Donation for Podium		25,000.00	Tax Deducted at Source	31,444.00
Donation for Books		15,828.00	Telephone Security-Reliance	3,500.00
Sri Gurudeva Ranade Award Fund		300,000.00		
Project Fund				
(As per Annexure attached)		202,077.80		
Securities			**Receivables and Advances**	
(As per list attached)		300,675.00	(As per list attached)	239,496.77
Loans & Advances				
Dr. S.P.Gupta - Loan		400,000.00	**Cash & Bank Balance**	
Akhil Bhartiya Itihas Sankalan Yojna		450,000.00	S.B.I. - S.B.A/c 45062	1,157.21
Bharat Sanskriti Parishad		1,500,000.00	S.B.I. - S.B.A/c 45082	2,216.33
S.B.I. - Loan		1,350,000.00	Indian Bank - S.B. A/c 460017	638,236.25
			Cash in Hand	18,474.18
Payables		827,825.04		
(As per list attached)				
Salary Payable		54,900.00		
		18,136,957.74		**18,136,957.74**

Sd/-
(General Secretary)

Sd/-
(Treasurer)

In terms of our Audit Report of even date attached
for RAJAN SHARMA & ASSOCIATES
CHARTERED ACCOUNTANTS

Sd/-
(Rajan Kumar Sharma)
Prop., M. No.84457

Place :- New Delhi
Dated :- 21.10.2005

THE INDIAN ARCHAEOLOGICAL SOCIETY

INCOME & EXPENDITURE ACCOUNT FOR THE YEAR END 31.03.2005

PARTICULARS	AMOUNTS (RS.)	PARTICULARS	AMOUNTS (RS.)
To Salary	767,033.00	By Grant for Publication-ASI	25,000.00
To Office Car Insurance	6,510.00	By Grant for Publication-ICHR (Pura No.33 & 34)	100,000.00
To News Paper &Periodicals	3,197.00	By Grant for Seminar	50,000.00
To Telephone Expenses	63,260.00	By Interest Received	178,561.46
To Conveyance & Travelling	61,919.00	By Rent	1,102,700.00
To Printing &Stationery	57,952.00	By Sale of Publication	130,060.00
To Electricity & Water Charges	131,490.00	By Annual Membership	200.00
To Establishment Expenses	12,085.50	By Interest on Bonds	61,955.55
To Conference Expenses	52,040.00	By Water Charges	13,898.00
To Computer Repair & Maintenance	33,875.00	By Generator Charges	53,608.00
To Repairs & Maintenance	166,422.00	By Miscellaneous Receipts	98.00
To Car Running & Maintenance	74,702.00		
To Municipal Taxes	1,982,930.00	By Excess of Expenditure over Income	2,153,566.09
To Postage, Courier & Stamps Charges	20,252.00		
To Internet Charges	7,000.00		
To Generator Running & Maint.	39,126.00		
To Bank Charges	2,296.60		
To Typing & Xeroxing	5,578.00		
To V.S.Wakankar Award	21,000.00		
To Membership Fees	1,800.00		
To Lecture Expenses	1,805.00		
To Ayodhya Project	3,087.00		
To Gujarat Project	69,229.00		
To Legal Charges	50.00		
To Office Expenses	620.00		
To Ground Rent-D.D.A.	11,500.00		
To Professional Charges	52,300.00		
To Publication Expenses	41,974.00		
To Watch & Ward Expenses	16,747.00		
To Audit Fees	26,000.00		
To Miscellaneous Expenses	283.00		
To Depreciation	126,739.00		
	3,869,647.10		**3,869,647.10**

Sd/-
(General Secretary)

Sd/-
(Treasurer)

In terms of our Audit Report of even date attached
for RAJAN SHARMA & ASSOCIATES
CHARTERED ACCOUNTANTS

Sd/-
(Rajan Kumar Sharma)
Prop., M. No.84457

Place :- New Delhi
Dated :- 21.10.2005

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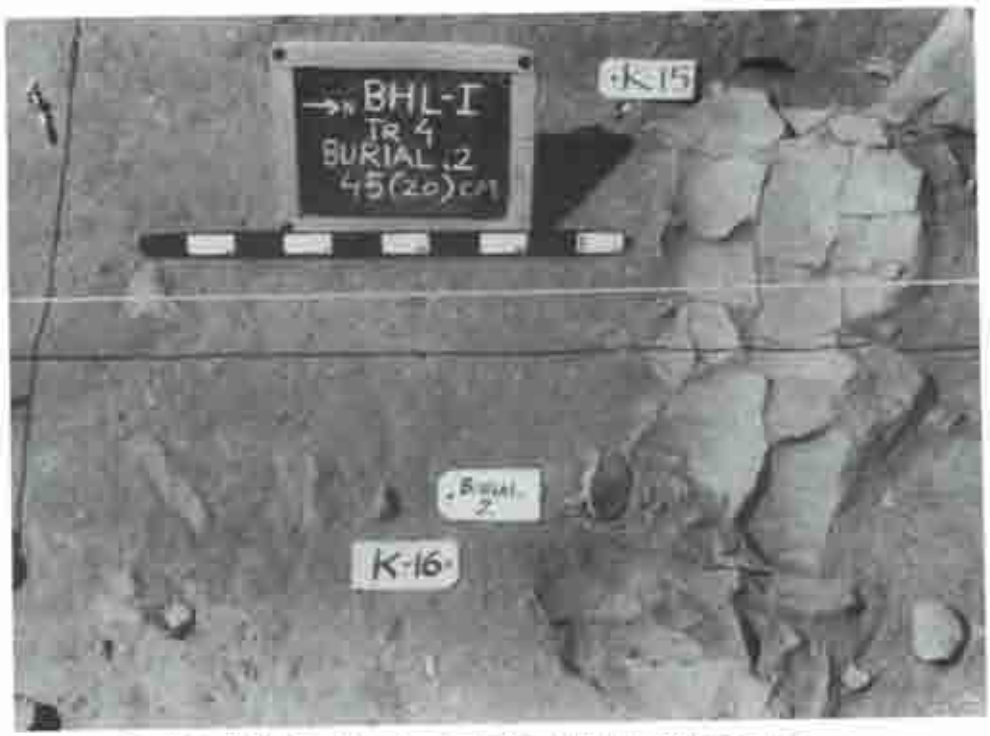
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Paddayya, Budihal, Pl. 1 : Child burial in a cylindrical pot from habitation area



Paddayya, Budihal, Pl. 2 : Cattle skull in a cushy soil from habitation area



Paddayya, Budihal, Pl. 3 : Cluster of cattle bones close to habitation area



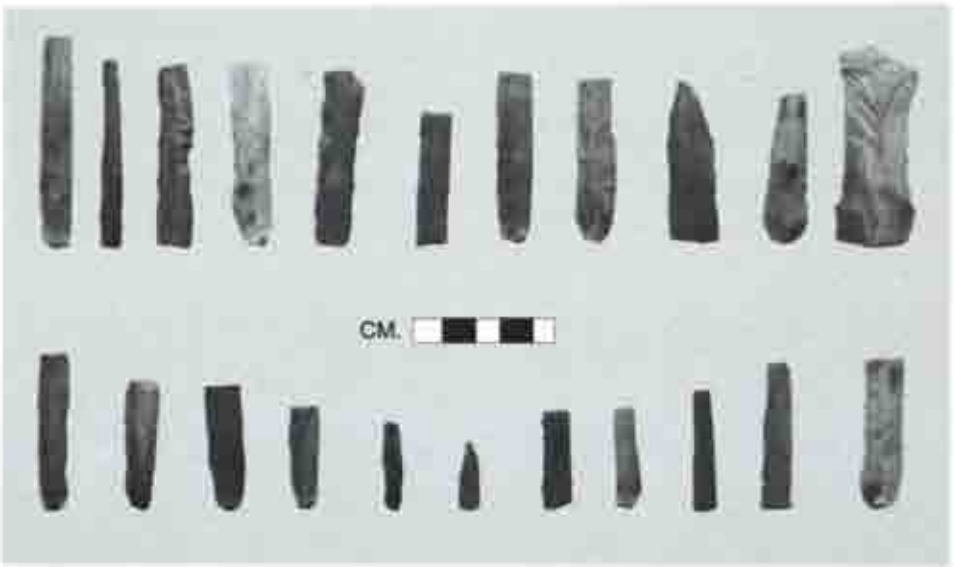
Paddayya, Budiha, Pl. 4 : Child burial in cowdung from cattle penning area



Sant, *et al.*, Baror, Pl. 1 : General view of mud-brick structures



Sant, *et al.*, Baror, Pl. 2 : Furnace, Period III



Sant, *et al.*, Baror, Pl. 3 : Chert blades



Sant, *et al.*, Baror, Pl. 4 : Bone and ivory objects



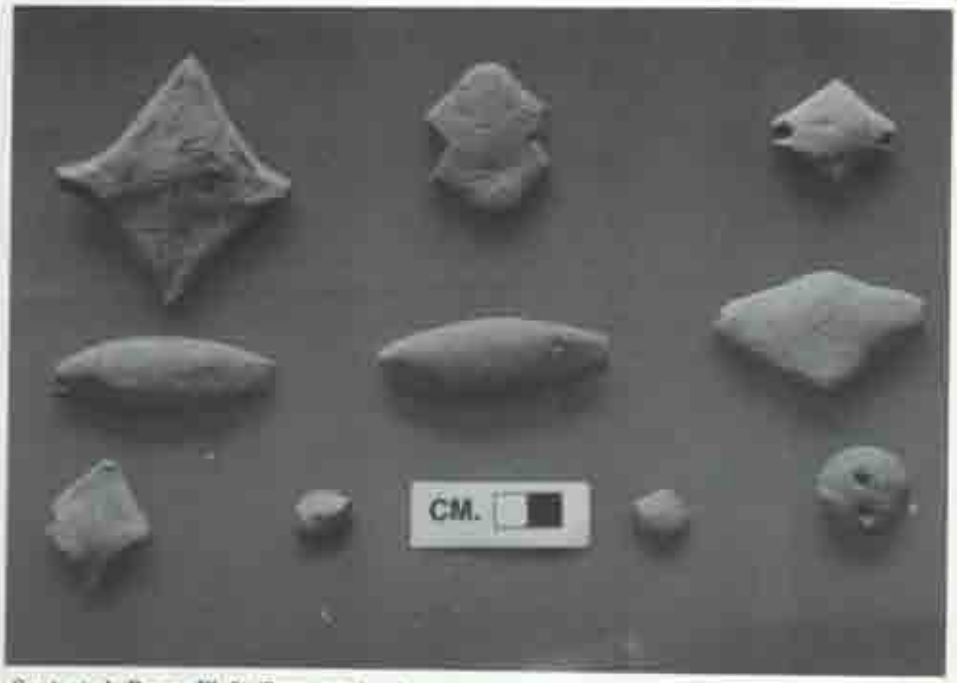
Sant, *et al.*, Baror, Pl. 5 : Copper objects



Sant, *et al.*, Baror, Pl. 6 : Terracotta human/composite figurines



Sant, *et al.*, Baror, Pl. 7 : Terracotta human/composite figurines



Sant, *et al.*, Baror, Pl. 8 : Terracotta beads



Sant, *et al.*, Baror, Pl. 9 : Painted pottery showing deer motifs



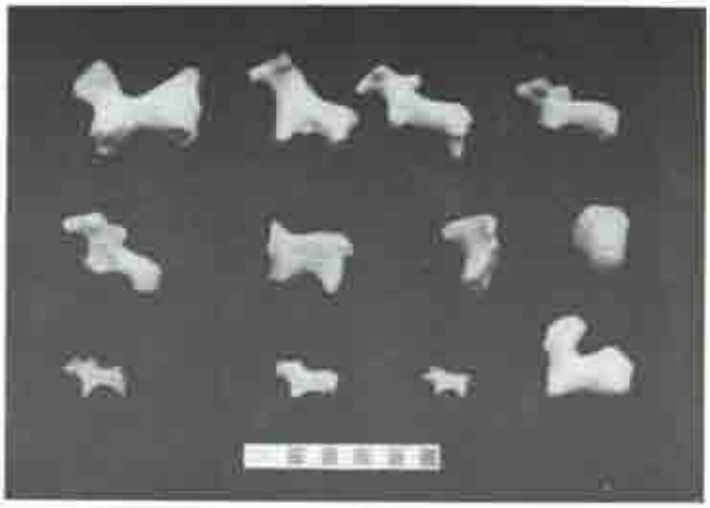
Sant, *et al.*, Baror, Pl. 10 : Painted potsherds, Period II



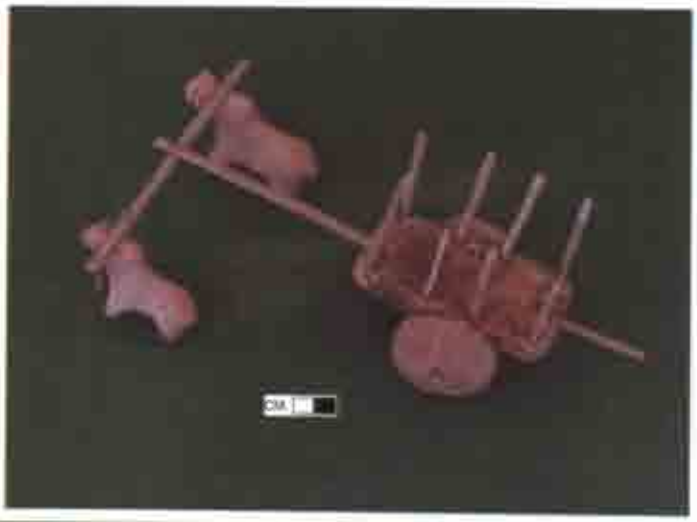
Sant, *et al.*, Baror, Pl. 11 : Painted potsherds, Period III



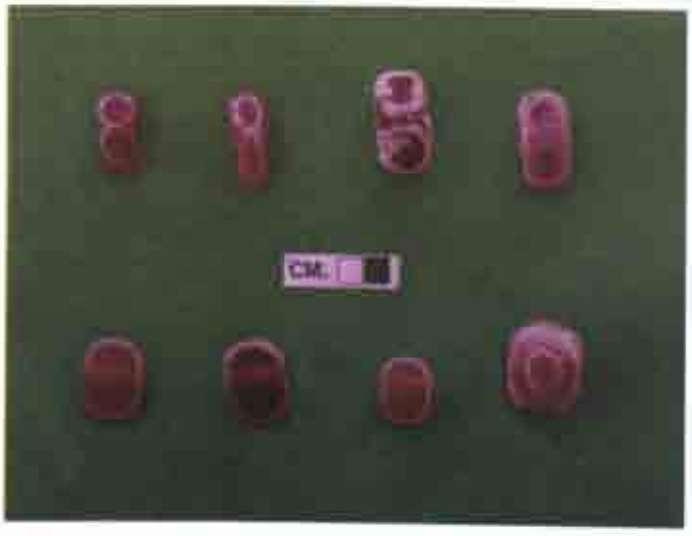
Sant, *et al.*, Baror, Pl. 12 : Terracotta painted bull, Period II



Sant, *et al.*, Baror, Pl. 13 : Terracotta animal figurines



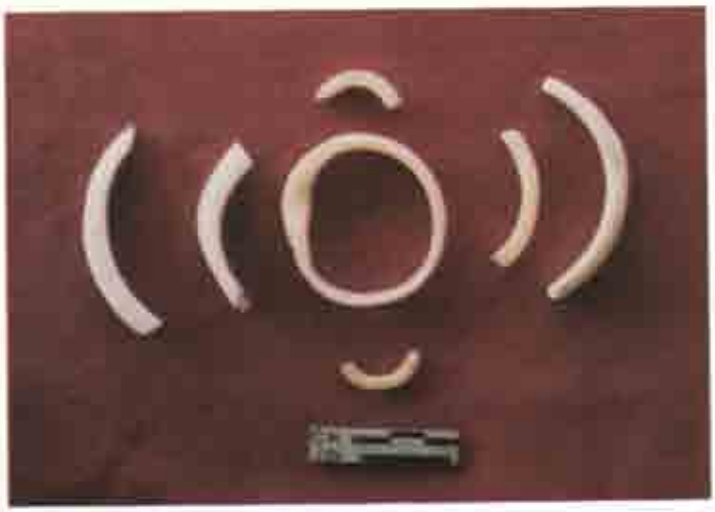
Sant, *et al.*, Baror, Pl. 14 : Terracotta toycart (reassembled)



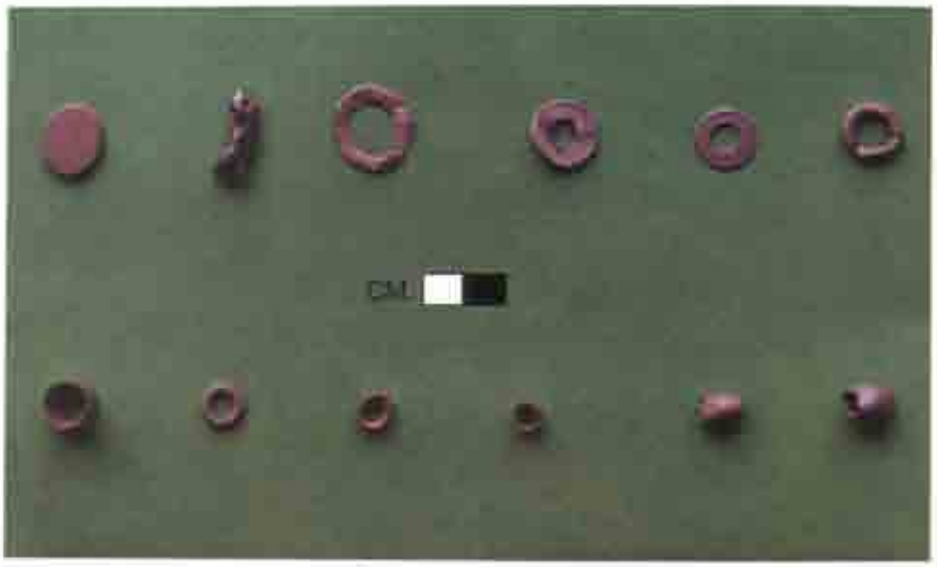
Sant, *et al.*, Baror, Pl. 15 : Etched carnelian beads Period III



Sant, *et al.*, Baror, Pl. 16 : Beads of semiprecious stones



Sant, *et al.*, Baror, Pl. 17 : Shell bangles



Sant, *et al.*, Baror, Pl. 18 : Gold beads, Period III



Sant, *et al.*, Baror, Pl. 19 : Weights of agate, Period III



Sant, *et al.*, Baror, Pl. 20 : Button seals, Period II



Sant, *et al.*, Baror, Pl. 21 : Seals. Period III



Sant, *et al.*, Baror, Pl. 22 : Seals. Period III

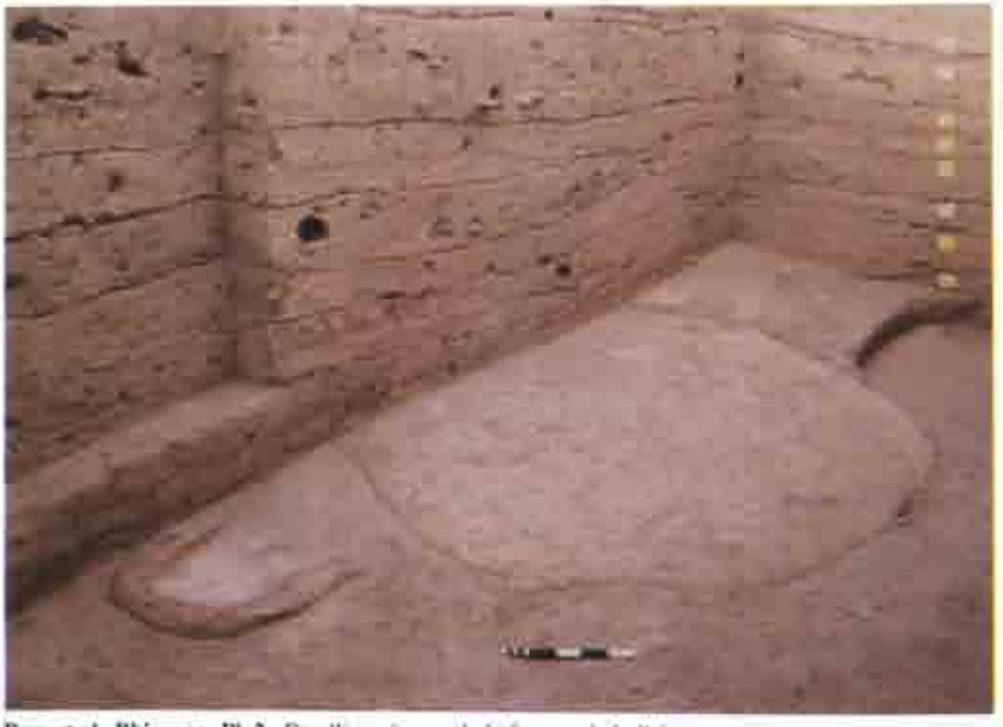


Sant, *et al.*, Baror, Pl. 23 : Unicorn Seal

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Rao, *et al.*, Bhirrana, Pl. 1 : Dwelling pit complex



Rao, *et al.*, Bhirrana, Pl. 2 : Dwelling pits, mud platform and chullah



Rao, *et al.*, Bhirrana, Pl. 3 : Deep incised wares



Rao, *et al.*, Bhirrana, Pl. 4 : Light incised wares



Rao, *et al.*, Bhirrana, Pl. 5 : Tan /chocolate wares



Rao, *et al.*, Bhirrana, Pl. 6 : Black burnished wares



Rao, *et al.*, Bhirrana, Pl. 7 : Bichrome wares



Rao, *et al.*, Bhirrana, Pl. 8 : Mature Harrappan house complex



Rao, *et al.*, Bhirrana, Pl. 9 : Painted jar



Rao, *et al.*, Bhirrana, Pl. 10 : Black stealite Seal



Rao, *et al.*, Bhirrana, Pl. 11 : Stylised animal head horn



Rao, *et al.*, Bhirrana, Pl. 12 : Terracotta composite animal figurine



Rao, *et al.*, Bhirrana, Pl. 13 : Terracotta painted spoked wheels



Rao, *et al.*, Bhirrana, Pl. 14 : Copper arrowheads



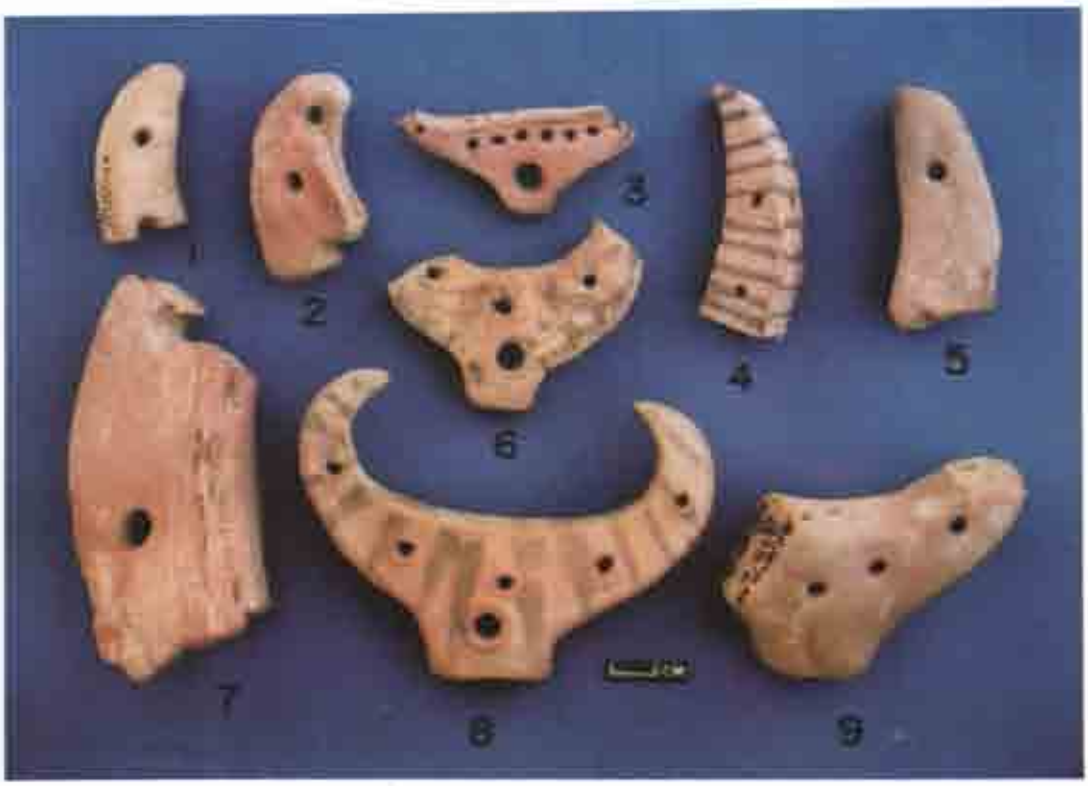
Rao, *et al.*, Bhirrana, Pl. 15 : Copper bangles and rings



Rao, *et al.*, Bhirrana, Pl. 16 : Etched carnelain beads



Rao, *et al.*, Bhirrana, Pl. 17 : Bone tools



Rao, Bhirrana, Pl. 1 : Stylised animal heads



Garge, Pl. 1 : Vandalized burnt-brick wall at Rakhigarhi(RGR-3)



Garge, Pl. 2 : Destruction of mound at Rakhigarhi(RGR-4)



Garge, Pl. 3 : Destruction of mound at Sotha with tractors



Garge, Pl. 4 : Remaining part of mound at Shyamalo Kalan



Garge, Pl. 5 : Destroyed mound at Jagan Khera



Garge, Pl. 6 : Potsherds from Siswal
(photo courtsey: Rendell Law)



Deo, *et al.*, Man Basin, Pl. 1 : Unit I (thin lense of greyish ash) at Sarkoli



Deo, *et al*, Man Basin, Pl. 2 : Unit II A showing brownish sandy silt and calcretization



Deo, *et al.*, Man Basin, Pl. 3 : Unit III showing cross-bedding in gravel



Deo, *et al.*, Man Basin, Pl. 4 : Disconformity between Unit III & Unit IV



Kanungo and Shinde, Kopia, Pl. 1 : Ghost wall in OAI



Kanungo and Shinde, Kopia, Pl. 2 : Trenches at locality I



Kanungo and Shinde, Kopia, Pl. 3 : Terracotta containers



Kanungo and Shinde, Kopia, Pl. 4 : An insitu NBP dish in layer 12 in OB1



Kanungo and Shinde, Kopia, Pl. 5 : A hearth in layer 12 in OB1



Kanungo and Shinde, Kopia, Pl. 6 : A crocodile shaped mouthpiece from layer 1 in AX1



Kanungo and Shinde, Kopia, Pl. 7 : Miniature pot: Kettle from layer 3 in AYI



Kanungo and Shinde, Kopia, Pl. 8 : A terracotta figurine from layer 1 in OB2



Kanungo and Shinde, Kopia, Pl. 9 : A skin scrubber (surface)



Kanungo and Shinde, Kopia, Pl. 10 : A ram made in NBP technology from layer 1 in OB1



Kanungo and Shinde, Kopia, Pl. 11 : An iron plough from layer 1 in OA1



Kanungo and Shinde, Kopia, Pl. 12 : Seed Indo-Pacific glass beads from layer 3 in AY1



Kanungo and Shinde, Kopia, Pl. 13 : Ear studs from layer 3 in OAI



Kanungo and Shinde, Kopia, Pl. 14 : Bone points from layer 3 and 4 in AYI



Kanungo and Shinde, Kopia, Pl. 15 : Bone hairpin from layer 5 in AYI



Kanungo and Shinde, Kopia, Pl. 16 : Agate bowl from layer 5 in ATX8



Kanungo and Shinde, Kopia, Pl. 17 :A crucible piece with glass sticking to it from layer 1 in OAI



Kanungo and Shinde, Kopia, Pl. 18 : Glass production remains in layer 3 in AYI



Singh, Kalchuri, Pl. 1 : Boudha Danda temple (650 AD)



Singh, Kalchuri, Pl. 2 : One of Sitamadhi temples (700 AD), *shikhara* details



Singh, Kalchuri, Pl. 3 : Bandhavgarh temple (750 AD), *shikhara* details



Singh, Kalchuri, Pl. 4 : Mahsavan Shiva temple (1000 AD), *Vrittakara shikhara*



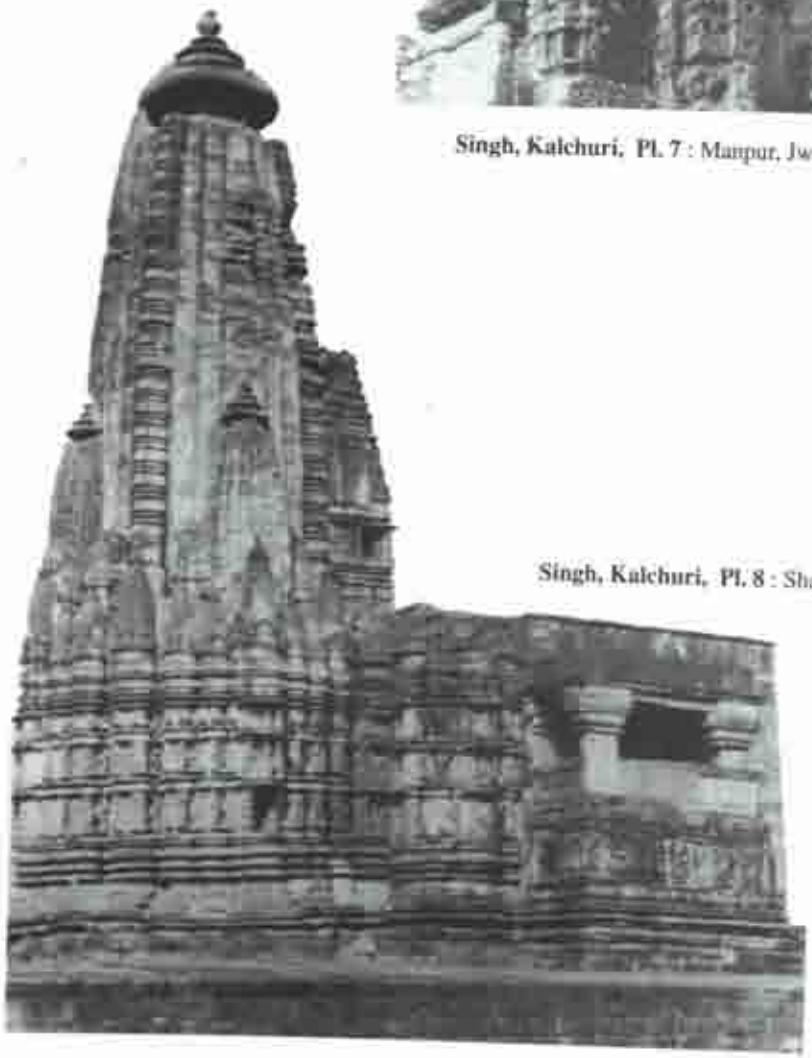
Singh, Kalchuri, Pl. 5 : Maihar, Shiva temple (1000 AD), *shikhara* details



Singh, Kalchuri, Pl. 6 : Jaso, Kunwara Matha (1000 AD), *shikhara* details



Singh, Kalchuri, Pl. 7 : Manpur, Jwalamukhi temple (1000 AD), *shikhara* details



Singh, Kalchuri, Pl. 8 : Shahdol, Virateshwara temple (1100 AD)



Singh, Kalchuri, Pl. 9 : Amarkantaka, Keshvanarayan temple (1100 AD)



Singh, Kalchuri, Pl. 10 : Lilalha, Shiva temple (1100 AD), *shikhara* details



Singh, Kalchuri, Pl. 11 : Deotalav, Somnath temple (1250 AD), *shikhara* details



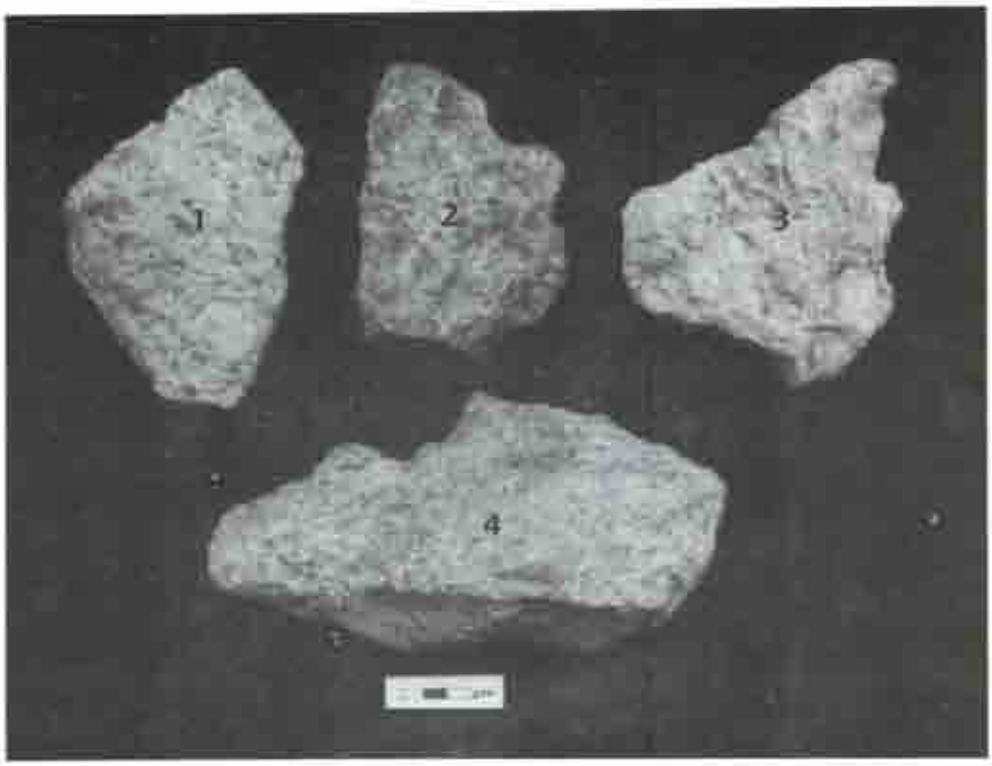
Singh, Kalchuri, Pl. 12 : Nachana, Chaturmukha mahadeva temple (700 AD), *Latina shikhara*



Singh, Kalchuri, Pl. 13 : Siddhanath Shiva temple (1100 AD), *Latina shikhara*



Singh, Kalchuri, Pl. 14 : Khokhala, Shiva temple (850 AD), pyramidal *shikhara*

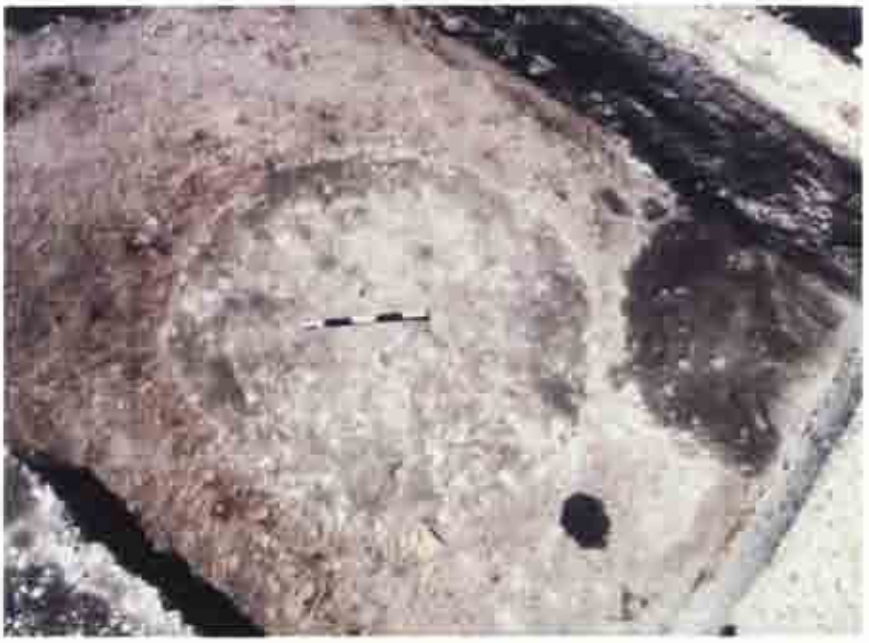


S. Vijayakumar, Mamom Pl. 1 : (1) Side-scrapper (2&4) Denticulates (3) Cleaver-cum-denticulate



S. Vijayakumar, Mamom Pl. 2 : (1) Borer (2) Backed knife (3) Borer-cum-knife (4) Pen knife

Purātattva 35



Gopal & Sundara, Lakkundi Pl. 1 : Neolithic pit dwelling



Gopal & Sundara, Lakkundi, Pl. 2 : Megalithic pot-burial



Pramanik, Junagarh, Pl. 1 : Mud dam before excavation



Pramanik, Junagarh, Pl. 2 : Partially exposed mud dam and chiselled bedrock



Pramanik, Junagarh, Pl. 4 : *Panthesu kup* (Mauryan?) at Suraj Kund



Pramanik, Junagarh, Pl. 3 : Silver coin of Chashtana

Pramanik, Junagarh, Pl. 5 : Shiva temple of Gupta period





M. Krishnakumari, Bhubaneshwar, Pl. 1 : Sculpture depicting the birth of Karttikeya



Dhaka, Rangpur, Pl. 1 : Male figure, 4th c. AD



Dhaka, Rangpur, Pl. 2 : Male dancing figure, 4th c. AD



Dhaka, Rangpur, Pl. 3 : Male dancing figure. 4th c. AD

Dhaka, Rangpur, Pl. 4 : Female dancing figure, 4th c. AD





Dhaka, Rangpur, Pl. 5 : Female dancing figure, 4th c. AD



Dhaka, Rangpur, Pl. 7 : Nagaraja, 4th c. AD

Dhaka, Rangpur, Pl. 6 : Shalbhanjika, 4th c. AD



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